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An Investigation of Bacterial Contamination Entering Patricia Bay and Mill Bay, Saanich Inlet

by

K. C. Turner and R. L. Morris*

MARINE RESOURCES BRANCH
MINISTRY OF ENVIRONMENT

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INTRODUCTION

The Environmental Protection Service (E.P.S.), Environment Canada, conducted a shellfish growing water survey of the intertidal waters of Saanich Inlet in 1979 (Gilmour, P.A. and T. Cook, 1979). From the survey E.P.S. concluded that some foreshore areas of Saanich Inlet were contaminated with fecal coliform bacteria and that consumption of shellfish from these areas may pose a health hazard. Schedule I closures prohibiting shellfish harvesting were subsequently imposed in the areas judged to be contaminated, and remain in place to this date.

The present investigation was undertaken by the Marine Resources Branch to locate the sources of coliform contamination causing shellfish harvesting closures in Patricia Bay and Mill Bay, Saanich Inlet, and to contact the agencies and individuals necessary for correction of the exposed contamination problems. The ultimate goal is the restoration of the water quality of Mill Bay and Patricia Bay to levels where shellfish closures may be lifted, and recreational shellfish collecting can resume for the public at large.

MATERIALS AND METHODS

Freshwater Samples

In an effort to locate the sources of fecal contamination causing harvesting closures in recreational shellfish collecting areas, freshwater samples were taken at sample stations in the watershed of creeks entering Patricia Bay and Mill Bay, and the foreshore of Saanich Inlet south of Mill Bay to Tanner Rock.

All freshwater samples were collected in sterile wide-mouth jars, stored in iced coolers, and were tested for fecal coliform content within four hours after collection using the multiple tube fermentation technique as described in Part 908 of the 14th Edition of Standard Methods for the Examination of Water and Waste Water. For fecal coliform analysis, Lauryl Tryptose Broth was used as the presumptive medium and EC medium was used for the confirmed test. At least three decimal dilutions (10 ml, 1.0 ml and 0.1 ml) of five tubes each were used to determine the most probable number (MPN) of fecal coliforms per 100 millilitres.

The sources of fecal contamination were located by comparing the levels of fecal coliform in the run-off water at various sites, followed by field observations and inspections of the site areas to locate the contamination discharge points.

Rainfall data were obtained from Victoria International Airport in Sidney (Appendix XIII).

Marine water Samples

Fecal coliform levels in the marine foreshore waters of the Patricia Bay and Mill Bay areas were monitored from June to November, 1980. All marine water samples for bacteriological analysis were collected in sterile wide-

mouth jars at a depth of 10 to 20 cm. The samples were collected on foot from the shore so that the depth of the water over the shellfish beds did not exceed one meter. Samples were stored in iced coolers and were analyzed within four hours after collection in the Department of Fisheries and Oceans, Fisheries Inspection Laboratory in Victoria.

Fecal coliform Most Probable Number (MPN) per 100 ml of marine samples was determined using the "modified A-1" technique. This technique employs A-1 medium in conjunction with the multiple tube fermentation technique, as described in Part 908 of the 14th Edition of Standard Methods for the Examination of Water and Waste Water. In this technique ten millilitre volumes of sample water were inoculated into 5 double strength tubes of A-1 medium and 1.0 ml and 0.1 ml volumes were inoculated into five tubes each of single strength. The tubes were incubated at 35 $\pm$ 0.5° C in air incubators, then transferred after 3 hours to a water bath at 44.5 $\pm$ 0.2° C and incubated for an additional 21 hours for a total of 24 hours $\pm$ 2 hours. After that period, all gassing tubes with growth were considered to be fecal coliform positive. The MPN was then determined according to the manner described in Standard Methods. Andrews and Presnell (1972) describe the use of A-1 medium and Kay (1978) has evaluated the technique.

According to the criteria used to classify Canadian shellfish growing waters, in order for marine waters to be bacteriologically safe for shellfish harvesting the fecal coliform median MPN cannot exceed 14/100 ml. Further, not more than 10% of samples may exceed 43/100 ml for a 5 tube decimal dilution test in those portions of the area most probably exposed to fecal contamination during the most unfavourable hydrographic and pollution conditions. The latter criterion is known as the 90 percentile.

In this report MPN results from marine sample stations in each of Patricia Bay, Mill Bay and the foreshore south of Mill Bay have been combined to calculate MPN medians and 90 percentiles for each area. This method enabled formation of the general conclusions on marine water quality in these foreshore areas required for this study.

The surface salinity at marine stations during marine sample collection was determined whenever possible using a Beckman RB4 - 250 Solu Bridge conductivity meter.

Clam Samples

Clam samples were collected from the foreshores of both Mill Bay and Patricia Bay. Five stations were established at Patricia Bay, five at Mill Bay and one in the Verdier Point Recreational Shellfish Reserve, approximately 3 km south of Mill Bay. Clam tissues were analysed for fecal coliform content at the Federal Fisheries Inspection Lab in Victoria, using their standard procedure for bacteriological analysis of shellfish meats. According to Fisheries Inspection standards, clam tissues containing a fecal coliform MPN of greater than 230/100 g are unfit for consumption.

The standards that have been established for shellfish growing water and clam tissue acceptability were used in this report only to facilitate discussion of the results and not as strict criteria on which to base conclusions on the acceptability of shellfish meats and growing waters in the study areas.

RESULTS

1. Patricia Bay

a. Freshwater sampling

Towner Park Road Drainage

Drainage along and from the north of Towner Park Road flows into Patricia Bay through two ditches at sites S10 and S11 (Figure 1). In the sample period of June through December, 1980, a fecal coliform MPN range of 17 to ≥2400/100 ml was recorded (mean = 888/100 ml) at site S10. Very high* fecal coliform MPNs were recorded on June 9, July 8, and November 4, 1980 (Appendix VII). At site S11 an MPN range of 23 to 9200/100 ml (mean = 1535/100 ml) was recorded in the sample period May 1980, to January 1981. Very high MPNs were recorded on May 27 (9200), June 9 (≥2400) and November 4 (1600).

Upstream from site S10 intermittent high coliform levels (1600 to ≥ 2400) were recorded in November and December at T1, T1A, T5, T6 and T9 (Figure 1, inset 2). Very high levels (≥24,000) were recorded at site T10 in December, while further upstream (T12) levels were low (Appendix VII).

Downey Road, West Saanich Road and Wain Road Drainage

Drainage in this area flows along Downey Road from the west and Wain Road from the east. These two drainage ditches join with the south flowing ditches along West Saanich Road and flow into Patricia Bay near site S12.

* The terms low, high, very high, excessive etc. are used only as qualitative descriptions of fecal coliform levels in the results sections of this report.

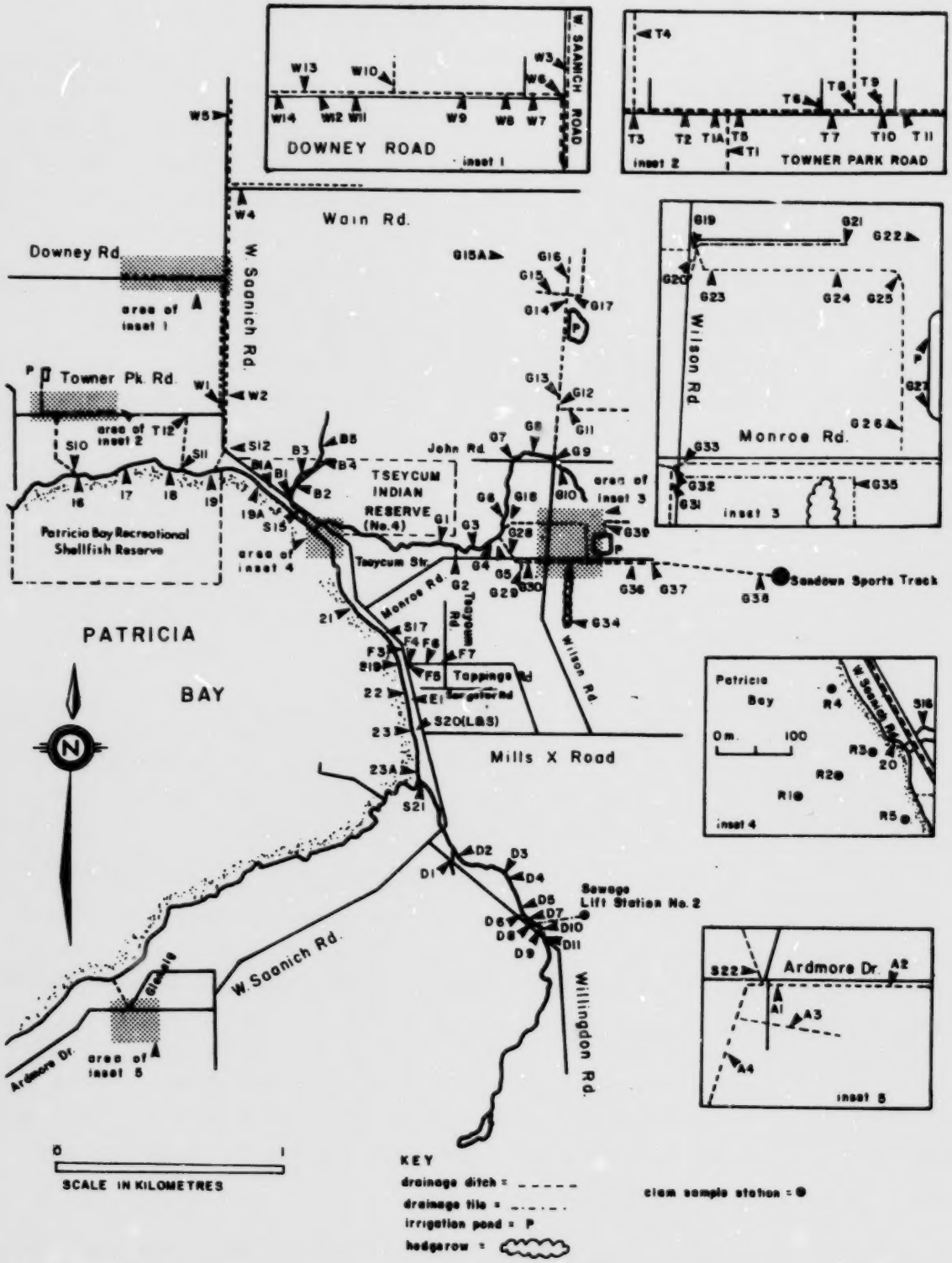

FIGURE 1. PATRICIA BAY FRESHWATER, MARINE and CLAM SAMPLE STATIONS.

At sample site S12 a coliform MPN range of <2 to 920/100 ml (mean = 310/100 ml) was recorded in the sample period June, 1980, to January, 1981 (Appendix VII). High MPN's were recorded on June 9 (920/100 ml) and November 4 (920/100 ml).

In December, 1980, and January, 1981, intermittent high levels were recorded at W6 and W9. A very high coliform MPN (≥24,000/100 ml) was recorded in January, 1981, at site W13.

North Creek* and Tseycum Indian Reserve Drainage.

The North Creek, on the Tseycum Indian Reserve flows from farmland north of the reserve and passes through the populated north west corner of the reserve to Patricia Bay (Figure 1).

At site S15, the mouth of the creek, a coliform MPN range of 79 to 1600/100 mls (mean = 670/100 ml) recorded in the sample period July through October, 1980. In November, 1980 to January, 1981, a range of 49 to ≥2400/100 ml (mean = 1445/100 ml) was recorded (Appendix VII). Upstream at site B4, the MPN ranged from 49 to 920/100 ml (mean = 287/100 ml) during July through October, and from 11 to ≥2400/100 ml (mean = 473/100 ml) from November to January.

Very high MPN levels occurred at site S15 and B4 in July, November and December, 1980.

*The name North Creek is applied to this unnamed (in the Gazetteer of Canada, Vol. 2, B.C.) creek.

Tseycum Stream Drainage

Tseycum Stream flows into Patricia Bay at site S16. The creek passes through an area which has numerous residences and hobby farms, as well as two large commercial dairy farms. Confluencing with Tseycum Stream is a network of drainage ditches and underground drainage tile systems. Thus, in reporting and discussing results from this extensive drainage system, it is best to divide the system into four areas of drainage.

(i) Lower Tseycum Stream; sites S16, G1-G5
(ii) Upper Tseycum Stream; sites G6-G17
(iii) Wilson Road drainage; sites G18-G27
(iv) Munro Road drainage; sites G28-G38

Lower Tseycum Stream (Sites S16, G1-G5)

Station S16, at the mouth of Tseycum Stream is subject to tidal intrusion, and thus becomes brackish during the higher tidal cycles. For this reason the upstream sample site G1, rather than S16, was used as an indicator of water quality at the mouth of Tseycum Stream (Figure 1).

At site G1 in the sample period July through October, 1980, a fecal coliform range of 220 to $\geq$2400/100 ml (mean = 1252/100 ml) was recorded, while in November, December and January an MPN range of 350 to $\geq$2400/100 ml (mean = 1595/100 ml) was recorded.

In November, December and January, a range of 350 to $\geq$2400 (mean = 1114/100 ml) at site G4 was recorded.

A sample taken at G5, ponded water next to a septic field, had a very high fecal coliform level of ≥2400/100 ml.

Coliform levels at site G3 ranged from 70 to ≥2400 (mean = 1199/100 ml) throughout the sample period June, 1980, through January 1981, (Appendix VII).

Upper Tseycum Stream (Stations G6-G17)

Station G6 (Figure 1) persistently had very high fecal coliform MPNs (≥2400/100 ml) through August and September 1980. In November 1980, to January, 1981, there was an MPN range of 130 to ≥2400/100 ml (mean = 1093/100 ml) at this station (Appendix VII).

At site G9, an MPN range of 23 to 350/100 ml (mean = 165/100 ml) was recorded in July. A sample on December 2, 1980, had a very high coliform MPN (≥2400/100 ml).

In December, January, March and April, 1981, very high coliform MPNs (1600 to ≥24,000/100 ml) were recorded consistently at stations G9, G12, G14, G15 and G15A.

Wilson Road Drainage (Sites G18-G27)

Station G19 (Figure 1, inset 3), in July through October, 1980, had an MPN range of 920 to ≥24,000. In November to January 1981, the range was 170 to ≥24,000/100 ml.

Downstream, at station G18 samples in November and December were extremely high (≥2400 to ≥24,000) (Appendix VII).

Sites G21 and G22 also had very high bacteria levels (1600-2400/100 ml) in November and December, 1980.

Station G23 had an MPN range of 1600 to 5400/100 ml (mean = 2633/100 ml) in November, December and January, while upstream, station G24 and G25 had MPN ranges of 280 to 540/100 ml (mean = 437/100 ml) and 79 to 2400/100 ml (mean = 937/100 ml), respectively, during the same sample period (Appendix VII).

Munro Road Drainage (Sites G28-G38)

A drainage ditch originates at the west end of the Sandown Sports Track oval, parallels Munro Road and flows into Tseycum Stream just downstream from site G28 (Figure 1). Fecal coliform levels at G28 ranged from 22 to $\geq$2400/100 ml (mean = 1628/100 ml) from November 1980, to January 1981. Upstream on the ditch at site G37 the MPN range was from 2 to 540/100 ml (mean = 105/100 ml). Four inflows (G29, G31, G32 and G36) enter the Munro Road ditch between G28 and G37 (Figure 1, inset 3). Site G29 had a fecal coliform range of 27 to $\geq$2400/100 ml (mean = 443/100 ml) during the period July to December, 1980. Water collected by a system of underground drainage tiles in the field at the southeast corner of Munro and Wilson Roads flows through site G35 and enters the Munro Road ditch at site G32. The fecal coliform levels at these sites were very high. At G32 the MPN ranged from 2400 to 9200/100 ml (mean = 4667/100 ml). One sample at G31, a ditch along Wilson Road, had an MPN of 2. Fecal coliform levels at G36 ranged from 2 to 540 (mean = 168/100 ml).

Tapping Road Drainage

A series of ditches drain a residential area near West Saanich Road, Tseycum Road and Tapping Road, and enters Patricia Bay via a culvert at site S19 (Figure 1).

Station S19 had a fecal coliform MPN of ≥2400/100 ml on November 4, 1980. Sampling in March 1981, revealed fecal coliform levels from 3500 to 9200/100 ml in the drainage area at sites F3, F4, F5, F6 and F7 (Appendix VII).

Airport Property Creek

The so-called Airport Creek* drains an area of largely undeveloped land in the south west corner of the Victoria International Airport property and flows into Patricia Bay. There is considerable tidal intrusion into the mouth of this creek past site S21, so that site D3 was taken as a measure of the water quality entering Patricia Bay (Figure 1).

On August 26, 1980, a fecal coliform MPN of 2400/100 ml was recorded at site D3. Further upstream at site D7, an MPN of ≥240,000 was recorded on September 2. A slight discharge from a sewage pump station overflow pipe, site D8, had an MPN of ≥2400/100 ml, on December 9, 1980, (Appendix VII). At site D11, the sample station furthest upstream, fecal coliform levels of 1600/100 ml were recorded on November 4 and 12, 1980.

*The name Airport Creek was applied to this unnamed (in the Gazetteer of Canada, Vol. 2, B.C.) creek.

These were followed by lowered MPNs in late November and December. Site D11 had an MPN range of 2 to 540/100 ml (mean = 81/100 ml) during the dry sample period of July through September, 1980.

Ardmore Drive Drainage

A ditch collects drainage water from the small residential area at Ardmore Drive and Glenelg Avenue and continues to the Patricia Bay foreshore (Figure 1). Site S22 had a coliform MPN range of 350 to 16000/100 ml (mean = 2850/100 ml) over the sample period from May to November 1980. Site A2 (Figure 1, inset 5) had a range of 350 to 1600/100 ml (mean = 790/100 ml) from July 1980 to January 1981. One sample at site A3 had a high MPN of $\geq$2400/100 ml in January 1981, (Appendix VII).

b. Marine Sampling

In Patricia Bay marine stations 16-23A (Figure 1) were used to monitor marine foreshore water quality. In August through October 1980, the median coliform MPN for all these stations combined was 4/100 ml with a 90 percentile of 49/100 ml. In November the combined median MPN and 90 percentile level were 33/100 ml and 540/100 ml, respectively (Table 1).

In September and October 1980 several stations in Patricia Bay had high MPN results ranging from 79-350 (see Appendix VIII).

Table 1. Summary of Fecal Coliform MPN Results for Patricia Bay Marine Sample Stations (16 to 23A).

Dry period	Median	90 Percentile
(August to October)	4	49
Wet period (November)	33	540

The mean surface salinity in Patricia Bay at stations 16-23A was 25.5°/oo on August through October, 1980, and 18.4°/oo on November, 1980, (Appendix VIII).

2. Mill Bay Area

a. Freshwater Sampling

Saanich Inlet Foreshore South of Mill Bay to Tanner Rock

A small creek meets the foreshore south of Mill Bay at site S50 (Figure 2). There was a fecal coliform range from 5 to 240/100 ml (mean = 55/100 ml) over the sample period June to November, 1980 (Appendix X).

Another small creek, site S48, is the only evident freshwater inflow onto the Verdier Point Recreational Shellfish Reserve (Figure 2). Coliform MPNs at this site ranged from 2 to 23/100 ml (mean = 17/100 ml) over the entire sample period.

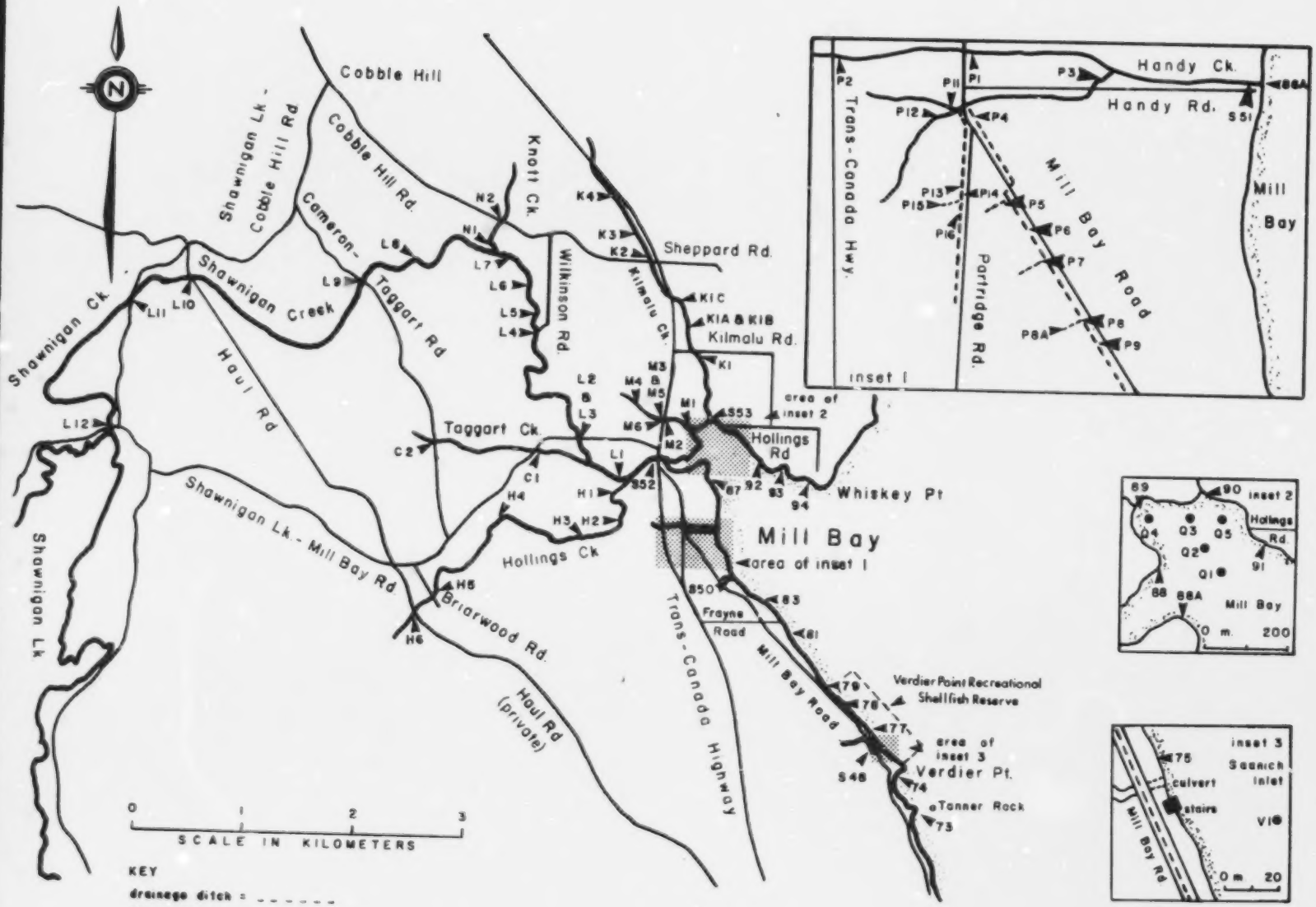

FIGURE 2. MILL BAY FRESHWATER, MARINE and CLAM SAMPLE STATIONS

Handy Creek

Fecal coliform levels ranging from 46 to ≥2400/100 ml (mean = 628/100 ml) were recorded at the mouth of Handy Creek (S51) (Figure 2) during the period from July through October (Appendix X). On November 3, 1980 a coliform MPN of 1600/100 ml was recorded at this site. The investigation during November revealed high fecal coliform levels at P3 ranging from 540 to ≥2400/100 ml (mean = 1514/100 ml). Upstream in the drainage area fecal coliform levels of ≥2400/100 ml were found at sites P6 and P8 in November and December, 1980 (Figure 2, inset 1).

Shawnigan Creek

Shawnigan Creek is the largest freshwater inflow to Mill Bay. MPN ranges recorded in the sample period July through October, 1980, at sample stations along lower Shawnigan Creek (Figure 2) are shown in Table 2.

Table 2. Summary of fecal coliform MPN ranges and means for seven sample stations on Shawnigan Creek recorded from July to October, 1980.

Sample station	MPN range/100 ml	MPN mean/100 ml
S52 (mouth of Creek)	49 to ≥2400	623
L1	240 to ≥2400	1140
L2	23 to ≥2400	984
L4	240 to 9200	2718
L5	79 to 540	384
L6	46 to 920	337
L7	17 to 1600	534

Ranges and means at stations S52, L1, L2, and L4 were significantly higher than at sites L5, L6 and L7 during the July through October period.

In November and December, 1980, MPN ranges were recorded at several of these stations on Shawnigan Creek (Table 3).

Table 3. A summary of fecal coliform MPN ranges and means for four sample stations on Shawnigan Creek recorded in November and December, 1980.

Sample station	MPN range/100 ml	MPN mean/100 ml
S52	70 to 920	318
L1	170 to 920	545
L4	170 to ≥2400	790
L5	130 to 540	315

Sites L8-L12 had a MPN range of 2 to 220/100 ml during the entire sample period July to December, 1980.

Hollings Creek Drainage

Hollings Creek is the largest tributary of Shawnigan Creek (Figure 2). At site H2 on Hollings Creek, immediately above the confluence with Shawnigan Creek, a coliform MPN range of 33-540/100 ml (mean = 264/100) was recorded in July through October, 1980, with one very high MPN result (≥2400) on August 18. Intermittent high coliform levels were recorded at sites H3 to H6, upstream on Hollings Creek (Appendix X).

Taggart Creek

Taggart Creek is a small tributary of Shawnigan Creek (Figure 2). Site C1 on Taggart Creek had a coliform MPN range from 7 to 5400/100 ml (mean = 1648/100 ml) in July through October 1980. Site C2, upstream, had an MPN range from 13 to ≥2400/100 ml (mean = 840/100 ml) (Appendix X).

In November, coliform MPN ranges of 49 to 920/100 ml (mean = 30/100 ml) and 790 to ≥2400/100 ml (mean = 1863/100 ml) were recorded at sites C1 and C2, respectively.

Knott Creek

Knott Creek is a minor tributary of Shawnigan Creek (Figure 2). In August through November, 1980, a fecal coliform MPN range of 49 to ≥2400/100 ml (mean = 778/100 ml) was recorded at site N2 (Appendix X). Two high fecal coliform results were recorded on August 11 (≥2400/100 ml) and November 3 (1600/100 ml).

Mill Bay Creek

Mill Bay Creek flows into the head of Mill Bay (Figure 2). In September, 1980, there was a coliform MPN range of 33 to ≥2400/100 ml (mean = 858/100 ml) at site M1, the creek mouth, while upstream at site M2, there was a range of 17-49 (mean = 32/100 ml) (Appendix X). In November and December, 1980, the coliform MPN ranges were 920-1600/100 ml and 1600 to ≥2400/100 ml at sites M1 and M2, respectively. A very high coliform MPN (≥24,000/100 ml) was recorded at site M6 in April, 1981. Negligible coliform levels occurred at sites M1 to M5 in March and April, 1981.

Kilmalu Creek

Kimalu Creek enters Mill Bay on the north shore (Figure 2). Fecal coliform levels during July at site S53 (mean MPN = 1649; range 240 to $\geq$2400) were generally high while upstream at site K2, the levels were considerably lower (mean MPN = 750; range from 130 to 1600) (Appendix X). Some high coliform levels were also recorded at site S53 in June, September and November, 1980, and at site K1 in August and November, 1980. Upstream, high bacteria levels were recorded at sites K2 and K3 in September and November. Highly contaminated effluent (MPN$\geq$24,000) was located between site K1 and K2 at site K1A.

b. Marine sampling

Marine water quality of the foreshore of Saanich Inlet between Tanner Rock and Whiskey Point was monitored at sample stations 73 to 94 (Figure 2).

In Mill Bay, water quality was monitored at stations 83 to 94 (Figure 2). In the dry periods from August through October the median fecal coliform MPN for stations 83 to 94 combined was 2/100 ml with a 90th percentile MPN of 31/100 ml. In the wet period of November, the median MPN was 49/100 ml while the 90th percentile was 170/100 ml (Table 4).

Table 4. Summary of fecal coliform MPN results for marine sample stations in Mill Bay from Frayne Road to Whiskey Point (83 to 94).

	Median	90 percentile
Dry period (August to October)	2	31
Wet period (November)	49	170

Fecal coliform results from Stations 87, 88, 88A, 89, 90 and 91 show the changeable water quality from dry to wet seasons in the immediate vicinity of three major freshwater inflows entering Mill Bay - Shawnigan Creek, Mill Bay Creek and Kilmalu Creek (Figure 2). During the dry season, the median MPN for these stations combined was 2/100 ml and the 90th percentile level was 22/100 ml. In the wet month of November, the median MPN for this group of stations was 130/100 ml, while the 90th percentile was 1600/100 ml (Table 5).

Table 5. Summary of fecal coliform MPN results for marine sample stations at the head of Mill Bay (87 to 91).

	Median	90 percentile
Dry period (August to October)	2	22
Wet period (November)	130	1600

Coliform results at stations 73, 74, 75, 77, 78, 79 and 81 reflect the water quality along the Saanich Inlet foreshore south of Mill Bay, from Frayne Road to Tanner Rock. This area includes the Verdier Point Recreational Shellfish Reserve (Figure 2). From August through October the median fecal coliform MPN from the above stations combined was <2/100 ml and the 90 percentile was 5/100 ml (Table 6). During November the median was 13/100 ml and the 90 percentile was 33/100 ml (Table 6).

Table 6. Summary of fecal coliform MPN results for marine sample stations from foreshore south of Mill Bay, Frayne Road to Tanner Rock (73 to 81).

	Median	90 percentile
Dry period (August to October)	<2	5
Wet period (November)	13	33

In Mill Bay, the mean surface salinity at stations 83 to 94 was 22.9°/oo in August through October, and 8.1°/oo in November, 1980. Stations 73 to 81 in the foreshore waters south of Mill Bay and including the Verdier Point Recreational Shellfish Reserve had mean surface salinities of 22.4°/oo in September and October, and 18.8°/oo in November, 1980 (Appendix XI).

In April, 1981, marine water quality was monitored at the Brentwood College sewage treatment plant outfall. The outfall discharges to Mill Bay. Negligible coliform levels were located by this sampling (Appendix XIV).

3. Patricia Bay and Mill Bay Area

a. Clam sampling

In Patricia Bay and in the Mill Bay area, sampling stations were established in the intertidal zones to monitor fecal coliform levels in shellfish meats (Figure 1, inset 4 and Figure 2, insets 2 and 3). These levels were compared to the shellfish meats standard for acceptability for consumption (230 fecal coliforms per 100 grams of shellfish meats).

In Patricia Bay, the five clam sample stations were monitored in September and October, the low run-off period of the study and seven samples were collected. Only two of the samples had coliform levels that exceeded the standard. In November, the high run-off period, all four samples collected from four of the stations in Patricia Bay exceeded the standard. Two samples in January 1982, from two stations met the standard (Appendix IX).

Five clam sample stations were monitored in Mill Bay and one station on the Verdier Point Recreational Shellfish Reserve. In September and October, one station in Mill Bay exceeded the shellfish meats standard. In November, two stations monitored in Mill Bay and one at Verdier Point all exceeded the standard (Appendix XII).

DISCUSSION

1. Patricia Bay

a. Freshwater sampling

Towner Park Road Drainage

The high bacteria MPNs on June 9 and November 4, as well as throughout December 1980, were probably the result of a general landwash of coliform bacteria after heavy rainfall (Appendix XIII). With continued rain fecal coliform levels decreased as the contamination sources were washed away. The origin of contamination during high run-off periods in the Towner Park Road area appears to be largely from manure deposits on nearby hobby farms. The inflows to Patricia Bay at S10 and S11 have little or no flow in dry weather periods.

Extremely high coliform levels at site T10 were caused by domestic effluent entering the drainage ditch from a dwelling adjacent to this site. Inquiries there determined that replacement of the septic system was incomplete, and domestic wastes were being diverted into the drainage ditches. The owners of the property have since completed repairs to the septic system. No other septic malfunctions were located along this drainage system.

The Ministry of Health information pamphlet on septic tank maintenance and the Ministry of Agriculture and Food's "Guidelines for Keeping Farm Animals on Small Acreages" have been distributed throughout the Towner Park area. This will help to

minimize the periodic high coliform levels which occur in this area, particularly during rainfall periods. Overall, this drainage area does not contribute a significant amount of coliform bacteria to Patricia Bay. Towner Park Road properties form the upland adjacent to the Patricia Bay Recreational Shellfish Reserve.

Downey Road, West Saanich Road, and Wain Road Drainage

The intermittent high bacteria levels at sites S12, W6, and W9 appeared to be caused by a general washdown of bacteria to Patricia Bay after heavy rainfall (Appendix XIII). At site W13, the highly contaminated discharge proved to be from a malfunctioning domestic septic system. This was confirmed by a dye test conducted by the Capital Regional District.

Septic tank maintenance and hobby farm management information was distributed throughout this drainage area.

The ditches of this system were dry in the low rainfall period of this study. This drainage area does not appear to contribute a significant coliform bacteria load to Patricia Bay.

North Creek and Tseycum Indian Reserve Drainage

Frequent high bacteria levels at site S15 probably have their source in malfunctioning septic systems on the Tseycum Indian Reserve. Upstream at site B4, the periodic high levels probably originate

from farm animal manure washed off the farmland situated north of the Reserve. The amount of contamination in North Creek at this location is considered negligible.

Sampling between sites S15 and B4, at B1, B2, and B3, did not conclusively indicate which of several septic systems adjacent to the creek was malfunctioning.

The source of high MPN's at S15 and B4 in July are unknown, but in November and December high levels were probably caused by heavy rainfall aggravating septic seepage on the Reserve.

The Tseycum Indian Band Manager was shown results of sampling on North Creek. Plans to determine which septic systems are malfunctioning and for the re-design of the reserve's drainage system were being developed at the time of writing.

Lower Tseycum Stream

High bacteria levels occurred at all stations (G1-G4) along lower Tseycum Stream throughout the sample period. It is suspected that these high levels are the product of contamination sources between sites G1 and G4 as well as from contamination entering the drainage system upstream from site G4, through sites G6, G18 and G28.

On the basis of high contamination levels persisting between G1 and G4, we requested that the Capital Regional District dye test all residences along lower Tseycum Stream, between sites G1 and G4. Three residences with confirmed septic malfunctions were issued notices ordering the systems to be repaired.

Literature on septic tank maintenance and hobby farm management has been distributed through this area.

Upper Tseycum Stream

The consistently high coliform levels at site G6 in August and September 1980, were probably caused by direct manure contamination reaching the creek. Several horses were observed to have direct access to the creek during these months. No contamination was located coming from upstream of this site during this period.

In the heavy rainfall period commencing in November 1980 (Appendix XIII) elevated contamination levels became evident at stations G9, G12, G14, G15, and G15A. These stations are all located along ditches which drain run-off from a large dairy farm. The largest identified source of contamination originated from this dairy farm. Surface run-off flowed through a manure storage pit, passed along a ditch through site G15, and entered Tseycum Stream through sites G12 and G9 located on a main drainage ditch on the farm property. In addition, milking parlour wastes which reached the main drainage ditch via an underground drainage tile (site G14) are the likely cause of high fecal coliform levels at this site.

At the request of the Marine Resources Branch, a representative of the B.C. Ministry of Agriculture and Food, Agricultural Environmental Control Program, inspected the above-mentioned dairy farm during the week commencing January 19, 1981. A recommendation was made that a ditch be dug to divert run-off away

from the manure pit and the above-mentioned main drainage ditch. Further improvements to the farm's drainage system will be monitored by the Agricultural Environmental Control Program.

Wilson Road Drainage

The sample data for sites G18, G19, G21, G23, indicate extremely high contamination levels with probable origins on the small farm directly adjacent to these sites. Sites G18, G19 and G21 are located on a ditch and underground drainage tile system which bisects the farm yard. There was consistent flow at these sites through the full sample period, and dyed water confirmed flow through the drainage tile from G21 to G19, as well as from G23 to G19 when increased rainfall created flow in the drainage ditch between G23 and G26 (Figure 1). Drainage from G19 joins Tseycum Stream immediately west of site G18.

Inspection of the farm property revealed a large manure pile located near site G21. Highly contaminated seepage from this pile was apparently contributing contamination to drainage water flowing through sites G19 and G23 and, ultimately, through site G18 to Tseycum Stream. The cattle on the farm have free access to the barnyard, the pasture and drainage ditch which flows to G23. This allows direct contamination of run-off with manure. In addition, the grass cover in the farm yard was destroyed, resulting in extremely muddy conditions and aggravation of the contaminated run-off situation. These factors probably contribute to the contamination problems at G19, G21, G22, and G23. The fecal

coliform levels at site G24 are much lower than the levels at G23. This indicates that most of the contamination reaching G23 originates probably in the run-off from the farm. No significant amounts of contamination appeared to be entering this drainage system from outside the farm.

On March 9, 1981, the owners of the farm were shown the results of the water sampling and provided with septic tank maintenance information and hobby farm management guidelines. As new owners of the farm, they inherited the existing bad conditions. They intend to remove the manure pile, sell the beef cattle, and restore grass cover to the farmyard. These improvements should effectively eliminate these major sources of contamination reaching Tseycum Stream from this farm.

Munro Road Drainage

Low fecal coliform levels through the sample period at site G37 indicate an insignificant amount of contamination reaches the Munro Road drainage ditch from the Sandown Sports Track area. The only apparent sources of high bacteria levels at S32 and G35 were a farm house and municipal hall located upslope from the tile drainage system. However, dye tests performed by the Capital Regional District on the septic systems at these locations were negative (April 8, 1981). The source of the contamination at G32 was not discovered, although it may have originated from a house that was under construction in the field at the southeast corner of Wilson and Munro Roads. If this is the case, this problem should be rectified as septic

systems for this house are installed.

It is likely that additional contamination was reaching site G28 in seepage from a septic system near site G5. Intermittent high coliform levels at site G29, with their probable source on the dairy farm to the south of this site, were considered to be insignificant, as were the consistently low levels at G31.

It is apparent that considerable contamination from the Munro Road drainage area reaches lower Tseycum Stream through site G28. To minimize future contamination, all residents in the area have been provided with septic system maintenance and hobby farm guideline information.

Tapping Road Drainage

The high fecal coliform levels at sites S19 and F3 to F7 were first recorded in November with the onset of heavy rains (Appendix XIII). There was no flow at Site S19 during the sample period prior to November. The coliform contamination probably originates from malfunctioning septic systems in the drainage area, although no specific offenders were identified at time of writing. This drainage system appears to contribute a significant amount of contamination to the foreshore waters of Patricia Bay during the winter months. The Capital Regional District has issued three notices for correction of sewage disposal malfunctions in this area.

Airport Creek

The high fecal coliform MPNs on the Airport Creek in August and September are related to a sewage system malfunction. A sewage transport line from the Institute of Ocean Sciences on Patricia Bay and the International Airport terminal to the Sidney sewage treatment plant parallels this creek between stations D1 and D4. Pump station #2 of this system is located approximately 50 m northeast of site D11. The overflow pipe from the pump station discharges sewage directly into the creek when the pump malfunctions, so contamination can directly enter the marine foreshore via the creek.

On September 2, 1980, a sewage discharge was seen flowing from the sewage overflow pipe into the creek, resulting in exceptionally high fecal coliform levels in the creek (see site D7, Appendix VII). At site D11, upstream from the overflow pipe, the coliform MPN in the creek was substantially less. The discharge ceased the same day it was reported to the Airport Manager.

The sewage discharge appeared to increase the coliform MPN level of the receiving waters near the mouth of the creek, at site 23A. For further information refer to marine water sample results and discussion.

Contaminated effluent was seen trickling from the overflow pipe over a period of 18 days between December 2, and 29th (station D8, December 9, 1980).

Fecal coliform levels at site D11 are generally low, so there appears to be no significant contamination sources upstream from this site. The exceptionally high coliform levels which occurred during early November are probably the result of a general washdown of contamination from non-point sources following heavy November rains (Appendix XIII).

On February 18, 1981, a letter was sent to Airport Facilities, Transport Canada, Vancouver, with information on the highly contaminated sewage discharges which enter the creek and contribute to unacceptably high coliform levels in the Patricia Bay marine foreshore waters. It was recommended by Marine Resources Branch that a sealed catchment basin would prevent such discharges from reaching the creek. Such a basin could be pumped out, and effluent returned to the sewage transport system when it is working normally. Transport Canada's intentions regarding the overflow system were unknown at time of writing.

Ardmore Drive Drainage

The consistently high fecal coliform levels at site S22 were largely caused by a malfunctioning septic system near site A3. The periodic high levels at site A2 are also thought to be caused by septic seepage from residences along Ardmore Drive, although these were not individually identified. On February 12, 1981, the Marine Resources Branch requested the Capital Regional District to perform a dye test on the septic system near site A3. The test was positive and a notice ordering correction of sewage disposal malfunctions was issued to the owner of the residence.

2. Mill Bay Area

a. Freshwater sampling

Drainage to South Mill Bay and Verdier Point

Both creeks (S50 and S48) had little or no flow in dry weather periods. They carried negligible bacteria levels and did not appear to contribute significant contamination to the marine receiving waters in both dry and wet seasons.

Handy Creek

During the period from July to October the amount of runoff in the Handy Creek drainage area was reduced. The sources of contamination causing intermittent high fecal coliform levels at site S51 are unknown. With increased rainfall in November, coliform levels at sites P3 and P6 increased, and contamination was found to be originating at site P8. One of two septic systems adjacent to this site is probably responsible for this contamination.

The Duncan Health Unit, Cowichan Valley Regional District, was provided on April 27 with results of bacteriological sampling and requested to perform dye tests on the above mentioned septic systems to determine if they are in working order. In January, 1982, results of dye testing at these residences were received. All were negative.

Shawnigan Creek

Manure management problems on a dairy farm on

Shawnigan Creek appeared to be the single major source of fecal coliform contamination entering Shawnigan Creek and causing high fecal levels at sites S52, L1, L2 and L4. In addition, the cattle on this farm had direct access to Shawnigan Creek from pasture land, making direct contamination of the creek with manure possible.

At sites L5, L6 and L7, located upstream from the farm, bacteria MPN's were substantially lower during July through October. The sources of periodic high bacteria levels at site L7 are unknown. Other sites (L8-L12) located along Shawnigan Creek to its source at Shawnigan Lake (Figure 2) had consistently low bacteria levels through the sample period, indicating insignificant contamination sources entering the upper reaches of the creek.

Two factors could be contributing to reduction of coliform MPN's at sites S52, L1, L2 and L4 in November and December. First, the greatly increased flow of Shawnigan Creek resulting from heavy rains beginning in November may have been obscuring continued contamination levels in the creek. Second, contamination originating from the dairy farm adjacent to these sites may have ceased by early November. Over the course of the sampling period a manure storage pit and spraying facility, as well as a stall barn to house the cattle, were under construction on the above mentioned dairy farm. With these improvements, manure wastes from the farm should no longer be contaminating Shawnigan Creek to the extent that was recorded during the study. No recommendations for further improvements on this dairy farm are deemed necessary at this time.

Hollings Creek

Hollings Creek does not appear to contribute a significant amount of fecal contamination to Shawnigan Creek as coliform levels were normally low throughout the sample period. No sources of contamination were found entering the creek, and the intermittent high MPNs at sites H3 to H6 are not thought to represent significant sources of contamination.

The high coliform result at site H2 on August 18, was probably the result of a washdown of bacteria from nonspecific sources following heavy rainfall on the previous day (Appendix XIII).

Taggart Creek

The Taggart Creek valley supports several residences, stables and hobby farms as well as two large dairy farms along its short length. Only one probable source of contamination was identified which may account for high bacteria levels at sites C1 and C2. Herds of dairy cattle from the two farms, above site C2 and between sites C1 and C2 have direct access to Taggart Creek during the summer months so that direct contamination of the drainage water with manure wastes is possible.

The high fecal coliform levels found at site C2 in early November coincided with heavy rainfall which probably caused a washdown of bacteria from nonspecific sources. This contamination apparently did not persist to site C1 where November coliform levels were generally low. It is thought that, aside from this initial washdown, coliform contamination

from this area is not a problem during the winter when cattle are confined to stall barns. Conversely, although the flow rate in Taggart Creek is reduced in summer months, it is thought the high coliform levels may constitute a significant source of contamination to Shawnigan Creek during this period. Fecal coliform levels in Taggart Creek could probably be reduced during the summer months if the cattle on the above mentioned farms were denied access to the creek.

At the time of publication, the B.C. Ministry of Agriculture and Food, Environmental Control Program had contacted dairy farms adjacent to sites C1 and C2 to pursue a practical solution to the problem of cattle with direct access to Taggart Creek.

Knott Creek

Knott Creek appears to periodically contribute only slight amounts of contamination to Shawnigan Creek. The high coliform result on November 3 probably resulted from bacterial washdown after heavy rainfall (Appendix XIII). The reason for the high coliform level on August 11 is unknown.

Mill Bay Creek

Mill Bay Creek had high bacteria levels at sites M1 and M2 in November and December following heavy rainfall. The sources of the contamination are probably malfunctioning septic systems near the creek. Sampling carried out in March and April, 1981, indicated that the contamination was entering the

creek through drainage ditch M6. Further sampling is required to conclusively determine the location of specific sources of contamination reaching Mill Bay via this creek. Mill Bay Creek has little or no flow in dry weather, but it is thought that with increased flow in winter the creek can contribute significant amounts of contamination to the head of Mill Bay.

Results of dye testing carried out by the Duncan Health Office of the Cowichan Valley Regional District at two residences adjacent to this creek were forwarded to Marine Resources Branch in January, 1982. All were negative. Occupants of a third residence could not be contacted.

Kilmalu Creek

The study results of July, 1980 indicate that a great deal of fecal contamination entered Kilmalu Creek between sites K1 and K2. Investigations in February and March 1981 located two possible contamination sources on a dairy farm, immediately upstream from site K1. The first source was contaminated effluent from a septic tile field for milking parlour and domestic wastes which was percolating to the surface and seeping down the nearby Kilmalu Creek bank. The farm owner attempted to remedy the faulty septic system by dumping sand over the tile field to absorb the effluent. The Agricultural Environmental Control Program, Ministry of Agriculture and Food has, at our request, inspected these repairs. If they prove to be adequate after a reasonable period of time, no further improvements will be required. If the problem continues the

farmer will be requested to install a new septic tile field.

The second possible source of contamination entering the creek was two manure piles situated near the creek. The Agricultural Environmental Control Program recommended that the farmer remove these manure piles to prevent additional contaminated run-off.

A small dairy farm situated on Kilmalu Creek immediately above site K2 was probably contributing some of the contamination found at site K2. High fecal coliform levels at site K2 and K3 in September and November occurred after heavy rains probably caused a washdown of coliform bacteria from manure deposits on the farm and from the non-point sources in the watershed of this creek.

The owner of this dairy farm was informed of the results of the sampling and provided with a copy of Environmental Guidelines for keeping Farm Animals on Small Acreages, with the intent of minimizing the contamination which may originate on his property.

As high coliform levels at site K2 are infrequent, it is thought there are no major contamination sources upstream from this site.

3. Patricia Bay and Mill Bay Area

a. Marine sampling

In Patricia Bay (stations 16 to 23A) fecal coliform levels exceeded the acceptable criteria for shellfish growing waters in November. This includes the waters over the Patricia Bay Recreational Shellfish Reserve (stations 16-18) (Figure 1). The Environmental Protection Service Schedule I closure in

Patricia Bay includes the tidal foreshore between the northern boundary of the Union Bay (Tseycum) Indian Reserve and the foot of Sangster Road (stations 19-23A) (Figure 1), and was conducted during February and March, 1979, or, as their criteria applied to water quality dictate, during the most unfavourable hydrographic and pollution conditions. It is apparent from the Marine Resources study that initially heavy rains caused excessive landwash of bacteria in November, after a prolonged dry period when bacteria remained held in the upland soils and when marine water quality was generally acceptable. It may, in fact, be possible to lift the Schedule I closure during the favourable hydrographic periods of the year i.e. the dry summer and early fall periods. In any case, it will be advisable to monitor shellstock from both the closure and recreational reserve areas of Patricia Bay for contamination. The recreational reserve has no major freshwater inflows entering its foreshore area.

Several high levels of contamination recorded at marine stations in Patricia Bay in September and October had unknown origins upland. However, the high bacterial level recorded on September 2 at station 23A off the mouth of the Airport Creek was likely the result of a monitored raw sewage discharge from the airport sewage line (see Discussion, Patricia Bay Freshwater Sampling). This indicates that an upland contamination discharge can have a direct and deleterious effect on marine foreshore water quality.

The foreshore waters in Mill Bay did not meet acceptable standards in November, probably because of excessive landwash of bacteria reaching the foreshore

via four inflows - Handy Creek, Mill Bay Creek, Shawnigan Creek and Kilmalu Creek. The Schedule I closure in the Mill Bay area extends from Whiskey Point to Frayne Road, or the foreshore probably effected by these inflows. The shellfish growing waters south of Mill Bay, from Frayne Road to Tanner Rock, however, met the established standard throughout the investigative period. This foreshore includes the Verdier Point Recreational Shellfish Reserve. There are no major freshwater inflows entering this portion of the foreshore, and very sparse upland habitation - two probable reasons for consistently acceptable water quality.

Reflecting increased landwash, the surface salinity of marine foreshore waters in Mill Bay and Patricia Bay decreased in November.

Brentwood College Sewage Treatment Plant Outfall Sampling

This treatment plant chlorinates its effluent to kill bacteria before discharge to Brentwood Bay. The outfall extends 460 m into Mill Bay, terminating at a depth of 15 m. The Environmental Protection Service suspected that the effluent from this plant, as well as with freshwater inputs at S52 and S53, was influencing water quality in Mill Bay (Gilmour, 1979). In the Marine Resources Branch study further poor water quality plus an application by Brentwood College to the Waste Management Branch to remove the chlorination segment of their treatment process prompted marine sampling (Appendix XIV). The results of this sampling indicated that the outfall was not

significantly elevating the coliform levels in the vicinity of the outfall. It was, however, concluded that a more rigorous sampling regime would have to be used to conclusively determine any effect on Mill Bay water quality from this outfall.

b. Clam sampling

The levels of coliform bacteria in clam tissues from the Mill Bay area and Patricia Bay were used as an indication of bacteria levels in the waters overlying the shellfish beds and, therefore, as an indication of bacteria concentrations entering the foreshore in freshwater run-off.

In both Patricia Bay and the Mill Bay area, the fecal coliform levels in shellfish meats generally reflect the fecal coliform levels in the overlying marine waters. Low contamination levels in marine waters during September correspond to the low fecal coliform results in shellfish meats in that period. (Appendices IX amd XII). The increase in coliform levels found in shellfish meats in November reflects the elevated November coliform levels in the overlying waters which, in turn, are a result of greater numbers of coliform bacteria reaching the foreshore areas in increased freshwater run-off in the rainy season (see Discussion of marine sampling in Mill Bay and Patricia Bay).

During a low precipitation period inflows will have less volume, but still may have a considerable contaminating impact on shellfish tissues. This may occur at low tides when inflows run undiluted across the intertidal area. This may have been the

cause of high bacterial levels in clam tissues in September and October, 1980 at Stations Q2 and Q3 in Mill Bay, and at stations R3 and R4 in Patricia Bay.

Although this study indicates that fecal coliform levels in shellfish meats generally reflect those in the overlying waters, more intensive sampling would be required to conclusively monitor such fluctuations in fecal coliform levels in shellfish meats.

c. Discussion of hydrographic conditions

The October 1980 rainfall was 26.6 mm (Appendix XIII) which is unusually dry compared to the 31-year average of 87.4 mm recorded at the Victoria Airport. Therefore, to include October sampling results in a discussion of water quality during the dry period of the year may be valid for this study, but may not reflect what can happen to water quality in October if rainfall approaches historical monthly levels. It is probable that water quality would normally deteriorate in October, as it did in the November sampling period of this investigation.

RECOMMENDATIONS REGARDING SCHEDULE I SHELLFISH BED CLOSURES

1. The results of this investigation indicate that the marine water quality and bacterial levels in shellfish meats may be acceptable in the Mill Bay area and close to acceptable in Patricia Bay during the low precipitation and run-off periods of summer and early fall. Since these two areas are popular recreational shellfish harvesting areas and peak use of such areas occurs in summer and fall, we suggest the possibility of seasonal shellfish bed openings. These seasonal openings would necessarily be contingent on a successful reduction of the contamination sources revealed by this investigation, particularly in the Patricia Bay area. It would also be advisable to carry out a specific sanitary survey to monitor the effects of the isolated rainfall events which can occur during the dry period of the year on marine water quality and/or shellfish tissues.

2. During the investigation considerable confusion was encountered among residents of the Mill Bay and Patricia Bay areas over the wording on the Schedule I shellfish bed closure signs whicn are posted to delineate the closed areas. The word 'contamination' on the signs is taken by many to mean 'red-tide (paralytic shellfish poisoning) contamination.' We therefore recommend that the signs specify 'sewage contamination' or 'bacterial contamination' in areas closed because of coliform contamination. This would help to eliminate confusion when the public hears of the lifting of red-tide closures via the media.

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APPENDIX I

Patricia Bay Freshwater Sample Stations' Locations and Descriptions

Patricia Bay freshwater sample stations' locations and descriptions

SAMPLE STATION	DESCRIPTION
S10	Creek mouth at beach near 755 Towner Park Road.
T1	Culvert under Towner Park Road at 755 Towner Park Road.
T1A	Drainage ditch along north side of Towner Park Road near 755 Towner Park Road. 2 m west of culvert under road.
T2	Pipe entering drainage ditch along north side ot Towner Park Road; 20 m west of culvert under road.
T3	South end of drainage ditch that parallels the west side of the property at 738 Towner Park Road.
T4	North end of drainage ditch that parallels the west side of the property at 738 Towner Park Road.
T5	Drainage ditch along north side of Towner Park Road near 755 Towner Park Road; 2 m east of culvert under road.
T6	Pipe entering drainage ditch at west side ot driveway at 802 Towner Park Road.
T7	Drainage ditch along north side of Towner Park Road 2 m east of driveway at 802 Towner Park Road.
T8	Drainage ditch from field enters drainage ditch along north side of Towner Park Road near the west side of driveway at 820 Towner Park Road.

SAMPLE STATION	DESCRIPTION
T9	Drainage ditch enters ditch along the north side of Towner Park Road 20 m west of mail box at 820 Towner Park Road.
T10	Drainage ditch from north enters ditch along the north side of Towner Park Road 2 m east of mail box at 820 Towner Park Road.
T11	Drainage ditch along the north side of Towner Park Road 2 m east of mail box at 820 Towner Park Road.
T12	North end of culvert under Towner Park Road near 945 Towner Park Road.
S11	Culvert at beach at 945 Towner Park Road.
S12	Culvert under West Saanich Road 75 m north of 10435 West Saanich Road; near "Rumble Strips" sign.
W1	Drainage ditch along the west side of West Saanich Road 2 m north of where the culvert passes under West Saanich Road, approximately 30 m north of Towner Park Road.
W2	Drainage ditch along the east side of West Saanich Road, approximately 2 m north of where the culvert passes under West Saanich Road, approximately 30 m north of Towner Park.
W3	Drainage ditch along the east side of West Saanich Road near the intersection with Downey Road.
W4	Drainage ditch along the north side of Wain Road approximately 10 m east of West Saanich Road.
W5	Drainage ditch along east side West Saanich Road at southwest corner of Deep Cove Elementary School yard.

SAMPLE STATION	DESCRIPTION
W6	Drainage ditch along north side of Downey Road at intersection with West Saanich Road.
W7	Pipe enters drainage ditch along north side Downey Road 2 m east of driveway at 966 Downey Road.
W8	Pipe enters drainage ditch along North side Downey Road 10 m west of driveway at 966 Downey Road.
W9	Drainage ditch along north side Downey Road between 966 and 958 Downey Road.
W10	Pipe from southwest corner of property at 958 Downey Road enters drainage ditch along north side Downey Road.
W11	Drainage ditch along north side Downey Road between 930 and 958 Downey Road.
W12	Pipe from lawn at 980 Downey Road entering drainage ditch along north side Downey Road approximately 10 m west of southeast corner of property.
W13	Pipe from lawn at 980 Downey Road entering drainage ditch along north side Downey Road approximately 20 m west of southeast corner of property.
W14	Drainage ditch along north side Downey Road 30 m west of 980 Downey Road.
B1A	Culvert at beach 20 m west of Tseycum Indian Reserve access road.
S15	Culvert in stream under West Saanich Road 20 meters east of 10395 West Saanich Road.
B1	Drainage ditch directly in front of 10403 West Saanich Road.

SAMPLE STATION	DESCRIPTION
B2	Stream passes under Tseycum Indian Reserve access road, 10 m north of 10403 West Saanich Road.
B3	Stream on Tseycum Indian Reserve 30 m. West of 10407 West Saanich Road.
B4	Stream on Tseycum Indian Reserve, 40 m west of north end of reserve access road behind 10410 West Saanich Road.
B5	Stream on Tseycum Indian Reserve where the stream crosses the north boundary of the reserve from adjacent farm to north.
S16	Large culvert at mouth of Tseycum Stream (near 10365 West Saanich Road).
G1	Tseycum Stream at bottom of 1290 Munro Road property.
G2	Drainage ditch under Munro Road at west end of 1350 Munro Road property.
G3	Tseycum Stream at culvert under driveway at 1390 Munro Road.
G4	Tseycum Stream behind 1420 Munro Road property.
G5	Seepage from septic field mound at 1420 Munro Road.
G6	Drainage ditch from slough flows south into Tseycum Stream; at small wooden foot bridge behind 1420 Munro Road property.
G7	Drainage ditch enters slough through culvert under John Road approximately 100 m west of the intersection of John Road and Wilson Road.
G8	Small stream enters drainage ditch along John Road approximately 50 m west of the intersection of John Road and Wilson Road.

SAMPLE STATION	DESCRIPTION
G9	Drainage ditch from north at northeast corner of the intersection of John Road and Wilson Road.
G10	Drainage ditch from farm at southeast corner of the intersection of John Road and Wilson Road. Enters drainage ditch at the intersection.
G11	Drainage ditch from east enters drainage ditch from north approximtely 100 m north of John and Wilson Road intersection on farm at 1435 Wain Road.
G12	Drainage ditch from north on farm at 1435 Wain Road, 2 m north of site G11.
G13	Drainage tile enters drainage ditch 10 m north of site G12.
G14	Drainage tile enters drainage ditch approximately 30 m south of north end of ditch on the farm at 1435 Wain Road.
G15	Drainage ditch from barn area on dairy farm at 1435 Wain Road before it enters the north end the main southflowing ditch near the irrigation pond.
G15A	Surface drainage north west of the bunker silo on the dairy farm at 1435 Wain Road, flowing towards the manure pit.
G16	Surface drainage north of the irrigation pond enters the north end of the main drainage ditch flowing southward on the dairy farm at 1435 Wain Road.
G17	Drainage ditch north of the irrigation pond at the edge of the forest, east of G16 on the dairy farm at 1435 Wain Road.
G18	West end of the drainage ditch from Wilson Road enters *Tseycum Stream* on the back of the property at 1420 Munro Road.

SAMPLE STATION	DESCRIPTION
G19	Drainage tile from under lawn at 10375 Wilson Road enters drainage ditch which passes under Wilson Road.
G20	Small culvert from under east side Wilson Road enters drainage ditch which passes under Wilson Road at 10375 Wilson Road.
G21	Drainage tile in covered hole north of the driveway at 10375 Wilson Road.
G22	Ponded water on fenceline at the east end of 10375 Wilson Road property.
G23	Drainage ditch along south side of 10375 Wilson Road property, at west end of ditch.
G24	Drainage ditch along south side of 10375 Wilson Road property approximately 15 meters west of northeast corner of pasture to south of property.
G25	Drainage ditch along south side of 10375 Wilson Road property at the northeast corner of the pasture.
G26	South end of drainage ditch at the southeast corner of the pasture at 10375 Wilson Road.
G27	Southwest corner of pond behind 1548 Munro Road.
G28	Drainage ditch east of 1420 Munro Road.
G29	Drainage tile from field at southwest corner Wilson and Munro Roads enters drainage ditch along south side Munro Road, opposite driveway at 1420 Munro Road.
G30	Drainage ditch along south side Munro Road 10 meters east of driveway at 1420 Munro Road.

SAMPLE STATION	DESCRIPTION
G31	Drainage ditch along west side of Wilson Road at southeast corner of Wilson and Munro Roads.
G32	Smaller (15 cm) of two culverts entering drainage ditch at southeast corner of Wilson and Munro Roads.
G33	Culvert at southeast corner Wilson and Munro Roads in drainage ditch along south side Munro Road.
G34	Drainage tile at south end of hedgerow in field at southeast corner Wilson and Munro Roads.
G35	Drainage tile (from south) in cement junction box at north end of hedgerow in field at southeast corner Wilson and Munro Roads.
G36	Drainage tile enters drainage ditch along south side Munro Road at 1583 Munro Road.
G37	Drainage ditch along south side Munro Road near 1650 Munro Road.
G38	Culvert from under racetrack oval at extreme eastern end of drainage ditch along south side Munro Road.
G39	Drainage ditch enters northeast shore of pond behind 1580 Munro Road.
S17	Culvert at beach at 10237 West Saanich Road.
S19	West end of culvert under West Saanich Road at the west foot of Tapping Road.
F3	Drainage ditch parallels east side of West Saanich Road, 2 m north of the culvert under West Saanich Road at the west foot of Tapping Road.

SAMPLE STATION	DESCRIPTION
F4	The north end of a culvert under Tapping Road at the west foot of Tapping Road.
F5	Drainage ditch on the north side of Tapping Road 2 m from the west foot of Tapping Road.
F6	Drainage ditch on the north side of Tapping Road midway between West Saanich Road and Tseycum Road.
F7	Drainage ditch at the northwest intersection of Tapping Road and Tseycum Road.
E1	Culvert at beach between Tapping and Mills Roads.
S20 (L)	Concrete culvert at beach at west end Mills Roads.
S20 (S)	Small drainage pipe at beach at west end of Mills Road.
S21	Large culvert at mouth of creek draining from Victoria International Airport property.
D1	Tributary of airport property creek under Willingdon Road approximately 75 m east of West Saanich Road.
D2	Culvert enters airport property creek from north approximately 100 m east of West Saanich Road.
D3	Airport property creek midway between mouth of creek and where the creek flows through the culvert under Willingdon Road.
D4	Small culvert enters airport property creek midway between mouth of creek and where the creek passes through the culvert under Willingdon Road.

SAMPLE STATION	DESCRIPTION
D5	Airport property creek approximately 175 m downstream from where the creek passes through the culvert under Willingdon Road.
D6	Airport property creek approximately 125 m downstream from where the creek passes through the culvert under Willingdon Road.
D7	Airport property creek at culvert approximately 75 m downstream from where the creek passes under Willingdon Road.
D8	Pipe from airport sewage pump station #2 enters airport property creek approximately 50 m downstream from where the creek passes through culvert under Willingdon Road.
D9	Airport property Creek approximately 40 m downstream from where the creek passes through the culvert under Willingdon Road.
D10	Drainage ditch enters airport property creek approximately 5 m downstream from where the creek passes through the culvert under Willingdon Road.
D11	Airport property creek just downstream from where the creek passes through the culvert under Willingdon Road.
S22	Culvert at northwest corner of Ardmore Drive and Glenelg Avenue.
A1	Drainage ditch along south side of Ardmore Drive 2 m east of entry into culvert at northwest corner of Ardmore Drive.
A2	Drainage ditch along south side of Ardmore at 9683 Ardmore Drive.
A3	Small drainage ditch on front lawn at 9675 Ardmore Drive.
A4	Drainage ditch west of driveway at 9675 Ardmore Drive.

APPENDIX II

Patricia Bay Marine Sample Stations' Locations and Descriptions

Patricia Bay marine sample stations' locations and descriptions

SAMPLE STATION	LATITUDE (North)	LONGITUDE (West)	DESCRIPTION
16	48°39.89'	123°27.95'	North shore of Patricia Bay off house with grey roof, 755 Towner Park Road.
17	48°39.92'	123°27.72'	Off white house, 865 Towner Park Road.
18	48°39.92'	123°27.55'	Off large tudor style house, 945 Towner Park Road.
19	48°39.87'	123°27.25'	Off North border to Indian Reserve No. 4. Near "rumble strips" sign on West Saanich Road.
19A	48°39.82'	123°27.12'	Off 10393 West Saanich Road.
20	48°39.74'	123°27.60'	Off South border to Indian Reserve No. 4 just north of large culvert on beach.
21	48°39.59'	123°27.95'	Off cement stairway to beach, near Patricia Bay grocery store, 10251 West Saanich Road.
22	48°39.50'	123°26.80'	Off 10177 West Saanich Road.
23	48°39.33'	123°26.73'	Off church at foot of Mills Road.
23A	48°39.33'	123°26.67'	Off mouth of Airport Creek (two large culverts on beach north of float plane ramp.)

APPENDIX III

Patricia Bay Clam Sample Stations' Locations and Descriptions

Patricia Bay clam sample stations' locations and descriptions

SAMPLE STATION	DESCRIPTION
R1	On a bearing 235°, 135 m from a point on the high tide mark 10 m to northwest of mouth of Tseycum Stream.
R2	On a bearing of 235°, 55 m landward from R1.
R3	On a bearing of 235°, 110 m landward from R1, and 25 m from high tide mark on northeast shore of Patricia Bay.
R4	100 m west-northwest of site R3, and 25 m below high mark.
R5	100 m east-southeast of site R3, 25 m below high tide mark.

APPENDIX IV

Mill Bay Freshwater Sample Stations' Locations and Descriptions

Mill Bay freshwater sample stations' locations and descriptions

SAMPLE STATION	DESCRIPTION
S48	Mouth of stream approximately 150 m north ot Verdier Point.
S50	Mouth of stream approximately 50 m north of government dock at foot of Keir Road.
S51	Culvert at mouth of Handy Creek at eastern end of Handy Road.
P1	Handy Creek at culvert under Mill Bay Road.
P2	Handy Creek at culvert under Highway 1.
P3	Tributary stream of Handy Creek at confluence approximately 75 m east of Mill Bay Road.
P4	Drainage ditch along east side of Mill Bay Road at southeast corner of Mill Bay and Handy Roads.
P5	Drainage pipe enters drainage ditch along west side of Mill Bay Road at northeast corner of 2670 Mill Bay Road property.
P6	Drainage ditch on west side of Mill Bay Road in front of 2670 Mill Bay Road.
P7	Small drainage ditch enters ditch west side Mill Bay Road at north east corner of property between 2668 and 2670 Mill Bay Road.
P8	Small drainage ditch enters drainage ditch along west side Mill Bay Road at northeast corner of 2662 Mill Bay Road property.

SAMPLE STATION	DESCRIPTION
P8A	Drainage ditch upstream from P8, between 2662 and 2668 Mill Bay Road.
P9	Drainage ditch along west side Mill Bay Road, south of P8.
P11	Small stream 5 m south of driveway at 2690 Mill Bay Road.
P12	Stream bordering backyard of property at 2680 Partridge Road.
P13	Spring enters drainage ditch along west side Partridge Road 1 m south of driveway of house at 2680 Partridge Road.
P14	Drainage ditch approximately 5 m north of driveway at Patterson Logging Co. (2670 Partridge Road).
P15	Small drainage ditch enters ditch along west side Partridge Road approximately 3 m north of driveway at 2670 Partridge Road.
P16	Drainage ditch along west side Partridge Road at north end of culvert under driveway at 2670 Partridge Road.
S32	Mouth of Shawnigan Creek below Highway 1 bridge.
L1	Shawnigan Creek under bridge on Shawnigan Lake - Mill Bay Road.
L3	Culvert enters Shawnigan Creek on west bank under north side of bridge on Shawnigan Lake - Mill Bay Road.
L4	Shawnigan Creek at south end of Wilkinson Road.
L5	Shawnigan Creek under driveway at 3086 Wilkinson Road.

SAMPLE STATION	DESCRIPTION
L6	Shawnigan Creek west of 3150 Wilkinson Road.
L7	Shawnigan Creek at end of access road into 3255 Cobble Hill Road.
L8	Shawnigan Creek at south end of 3274 Cobble Hill Road property.
L9	Shawnigan Creek under bridge on Cameron - Taggart Road.
L10	Shawnigan Creek under Haul Road.
L11	Shawnigan Creek under Cobble Hill - Shawnigan Lake Road.
L12	Shawnigan Creek at outflow from Shawnigan Lake.
H1	Hollings Creek approximately 30 m above confluence with Shawnigan Creek.
H2	Hollings Creek at large culvert approximately 130 m above confluence with Shawnigan Creek.
H3	Hollings Creek west of Bayview elementary school in Mill Bay.
H4	Hollings Creek under bridge in Cedar Creek mobile home park on Shawnigan Lake - Mill Bay Road.
H5	Hollings Creek under Briarwood Road.
H6	Hollings Creek under Haul Road.
C1	Taggart Creek under Shawnigan Lake - Mill Bay Road.
C2	Taggart Creek under Cameron - Taggart Road.
N1	Nott Creek approximately 20 m above confluence with Shawnigan Creek, at south end of property at 3234 Cobble Hill Road.

SAMPLE STATION	DESCRIPTION
N2	Nott Creek under Cobble Hill Road opposite 3237 Cobble Hill Road.
M1	Mouth of Mill Bay Creek (entering at head, or north west end of Mill Bay).
M2	Mill Bay Creek at eastern end of culvert under Highway 1.
M3	Mill Bay Creek west of Highway 1, 10 m upstream from culvert under Highway.
M4	Mill Bay Creek 50 m west of Highway 1, beyond the wooden fence which crosses the creek.
M5	Drainage ditch parallels Highway 1 and enters Mill Bay Creek from the north on the western side of the culvert under Highway 1.
M6	Drainage ditch parallels Highway 1 and enters Mill Bay Creek from south of the western side of the culvert under Highway 1.
S53	Mouth of Kilmalu Creek, trail approximately 200 m west of west end Hollings Road.
K1	Kilmalu Creek under Kilmalu Road approximtely 200 m east of Highway 1.
K1A	Ponded effluent on farm property at 3066 Telegraph Road.
K1B	Kilmalu Creek 100 m north of Kilmalu Road on farm property at 3066 Telegraph Road.
K1C	Kilmalu Creek 250 m north of Kilmalu Road on farm property at 3066 Telegraph Road.
K2	Kilmalu Creek under Sheppard Road approximately 50 m west of Highway 1.

SAMPLE STATION	DESCRIPTION
K3	Kilmalu Creek at north end of access road to 871 Sheppard Road.
K4	Kilmalu Creek at west side of Highway 1 approximately 700 m north of Sheppard Road.

APPENDIX V

Mill Bay Marine Sample Stations' Locations and Descriptions

Mill Bay marine sample stations' locations and descriptions

SAMPLE STATION	LATITUDE (North)	LONGITUDE (West)	DESCRIPTION
73	48°37.71'	123°31.61'	West Saanich Inlet. West of Tanner Rock off Indian Reserve No. 11.
74	48°37.87'	123°31.71'	West Saanich Inlet Indian Reserve No. 11. Head of small bay south of Verdier Point.
75	48°38.00'	123°31.74'	West Saanich Inlet. Beach area just north of Verdier Point.
77	48°38.10'	123°31.95'	West Saanich Inlet. Verdier Point Recreational Shellfish Reserve north of culvert in clear beach area.
78	48°38.21'	123°32.10'	South Mill Bay. Cement retaining wall at beach north of 77.
79	48°38.33'	123°32.22'	South Mill Bay. Small beach north of 78 access by Baker View Road.
81	48°38.53'	123°32.45'	Mill Bay between two disused boat launches. Access by Frayne Road.
83	48°38.72'	123°32.68'	South Mill Bay south of government dock - access by Keir Road.
86A	48°39.05'	123°33.19'	South Mill Bay off foot of Handy Road.

SAMPLE STATION	LATITUDE (North)	LONGITUDE (West)	DESCRIPTION
87	48°39.27'	123°33.10'	Mill Bay off Brentwood College 150 m northwest of Brentwood College Sewage Treatment Plant.
88A	48°39.28'	123°33.27'	Mill Bay off mouth of Shawnigan Creek, south side.
88	48°39.43'	123°33.27'	Mill Bay off mouth of Shawnigan Creek, north side.
89	48°39.52'	123°33.23	Mill Bay at head of small bay at northwest end of Mill Bay.
90	48°39.53'	123°33.18'	Mill Bay off small creek (Kilmalu Creek) entering north side of Bay.
91	48°39.47'	123°33.07'	Mill Bay. Slight beach area 20 m southeast of foot of Hollings Road.
92	48°39.42'	123°32.95'	Mill Bay off small private stone dock southeast of 91.
93	48°39.37'	123°32.68'	Mill Bay in small cove northwest of Whiskey Point.
94	48°39.32'	123°32.48'	Mill Bay off cement retaining wall in cove at Whiskey Point.

APPENDIX VI

Mill Bay Clam Sample Stations' Locations and Descriptions

Mill Bay clam sample stations' locations and descriptions

SAMPLE STATION	DESCRIPTION
Q1	On a bearing of 145° from small point of land 50 m southwest of mouth of Kilmalu Creek; 195 m from high tide mark.
Q2	On a bearing of 145°, 70 m landward from Q1.
Q3	On a bearing of 145°, 70 m landward from Q2.
Q4	On a bearing of 260°, 100 m from Q3; 85 m from high tide mark on north shore Mill Bay.
Q5	On a bearing of 80°, 75 m from Q3; 50 m from high tide mark on north shore Mill Bay.
VERDIER POINT RECREATIONAL OYSTER RESERVE	
V1	Thirty meters below high tide mark (measured from the high tide mark 20 m southeast of stairs to beach); approximately 175 m northwest of Verdier Point.

APPENDIX VII

Patricia Bay Bacteriological Results for Freshwater Sample Stations

Patricia Bay bacteriological results
for freshwater sample stations.

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
S10	Jun 2/80	240
	Jun 9/80	≥2400
	Jun 23/80	540
	Jul 1/80	540
	Jul 8/80	≥2400
	Jul 14/80	17
	Nov 4/80	≥2400
	Dec 8/80	33
	Dec 15/80	220
	Jan 6/81	94
T1	Jun 23/80	13
	Jul 1/80	540
	Jul 8/80	110
	Jul 14/80	220
	Jul 21/80	33
	Jul 29/80	11
	Nov 4/80	≥2400
	Nov 25/80	≥2400
T1A	Dec 2/80	≥2400
	Dec 8/80	33
	Dec 17/80	13
	Jan 6/81	170
T2	Dec 8/80	49
T3	Dec 8/80	11
T4	Dec 8/80	33
T5	Dec 2/80	≥2400
	Dec 8/80	540
	Jan 6/81	350
T6	Dec 8/80	920
T7	Dec 8/80	110
T8	Dec 15/80	540
T9	Dec 8/80	540
	Dec 15/80	1600
T10	Dec 8/80	≥2400
	Dec 15/80	≥24,000
T11	Dec 8/80	5
T12	Jun 23/80	33
	Jul 1/80	49
	Jul 8/80	33
	Jul 14/80	33
	Nov 25/80	49
S11	May 27/80	9200
	Jun 2/80	130
	Jun 9/80	≥2400
	Jun 23/80	33
	Jul 1/80	49
	Jul 8/80	350
	Jul 14/80	23
	Nov 4/80	1600
	Jan 6/81	33
S12	Jun 9/80	920
	Jun 23/80	22
	Jul 1/80	31
	Jul 8/80	8
	Jul 14/80	8
	Nov 4/80	920
	Dec 2/80	540
	Dec 15/80	< 2
	Jan 6/81	33
W1	Dec 8/80	2

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
W2	Dec 8/80	8
	Dec 15/80	5
W3	Dec 8/80	49
	Dec 15/80	46
W4	Dec 8/80	33
W5	Dec 8/80	79
W6	Dec 8/80	920
	Dec 15/80	140
	Jan 6/81	920
W7	Dec 15/80	130
W8	Dec 15/80	33
W9	Dec 15/80	≥2400
W10	Dec 8/80	17
W11	Dec 17/80	350
	Jan 6/81	17
W12	Jan 6/81	8
W13	Jan 6/81	≥24,000
W14	Dec 8/80	49
B1A	Dec 15/80	13
S15	May 27/80	350
	Jun 2/80	33
	Jun 9/80	350
	Jun 23/80	220
	Jun 1/80	110
	Jul 8/80	350
	Jul 14/80	1600
	Jul 21/80	79
	Jul 29/80	1600
	Aug 6/80	920
	Aug 12/80	240
	Aug 19/80	540
	Aug 26/80	350
	Oct 28/80	920
	Nov 4/80	≥2400
	Nov 18/80	≥2400
	Nov 25/80	≥2400
	Dec 2/80	1600
	Dec 9/80	350
	Dec 15/80	49
	Jan 7/81	920
B1	Jan 7/81	110
B2	Dec 9/80	540
	Dec 15/80	23
	Jan 7/81	46
B3	Dec 15/80	70
B4	Jul 29/80	920
	Aug 6/80	240
	Aug 12/80	240
	Aug 19/80	220
	Aug 26/80	170
	Sep 2/80	49
	Oct 28/80	170
	Nov 4/80	≥2400
	Nov 12/80	33
	Nov 18/80	240
	Nov 25/80	79
	Dec 9/80	79
	Jan 7/81	11
B5	Aug 19/80	46
S16	May 27/80	1700
	Jun 2/80	540
	Jun 9/80	≥2400
	Jun 23/80	920
	Jul 1/80	240
	Jul 8/80	≥2400
	Jul 14/80	49
	Jul 21/80	170
	Jul 29/80	170
	Aug 6/80	49
	Aug 12/80	5

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
S16 Cont'd	Aug 19/80	110
	Aug 26/80	110
	Sep 2/80	350
	Nov 4/80	≥2400
G1	Jul 21/80	≥2400
	Jul 29/80	≥2400
	Aug 6/80	540
	Aug 12/80	220
	Aug 19/80	1600
	Oct 28/80	350
	Nov 25/80	920
	Dec 2/80	≥2400
	Dec 9/80	≥2400
	Dec 16/80	1100
	Jan 5/81	350
	Jan 13/81	≥2400
G2	Dec 17/80	130
G3	Jun 23/80	540
	Jul 1/80	≥2400
	Jul 8/80	1600
	Jul 14/80	≥2400
	Jul 21/80	1600
	Jul 29/80	540
	Aug 6/80	130
	Aug 12/80	1600
	Aug 19/80	540
	Aug 26/80	540
	Sep 2/80	≥2400
	Sep 23/80	170
	Sep 29/80	≥2400
	Oct 7/80	70
	Oct 28/80	240
	Nov 4/80	≥2400
	Nov 12/80	1100
	Jan 13/81	920
G4	Oct 7/80	70
	Oct 28/80	1600
	Nov 4/80	≥2400
	Nov 12/80	700
	Dec 9/80	1600
	Dec 16/80	330
	Jan 13/81	540
G5	Oct 28/80	≥2400
G6	Aug 12/80	≥2400
	Aug 19/80	≥2400
	Sep 2/80	≥2400
	Nov 4/80	≥2400
	Nov 12/80	130
	Dec 2/80	≥2400
	Dec 9/80	920
	Jan 5/81	540
	Jan 13/81	170
G7	Jan 13/81	350
G8	Jan 13/81	540
G9	Jun 23/80	46
	Jul 1/80	350
	Jul 8/80	79
	Jul 14/80	49
	Jul 21/80	27
	Jul 29/80	23
	Dec 2/80	≥2400
G10	Dec 9/80	79
	Dec 16/80	17
	Jan 5/81	46
G11	Dec 9/80	240
	Dec 16/80	49
G12	Dec 9/80	≥2400
	Dec 16/80	2400
	Jan 5/81	1600
G13	Jan 13/81	170
G14	Jan 13/81	≥24,000
G15	Dec 16/80	≥2400
	Jan 13/81	≥24,000

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
G15A	Jan 13/81	≥2400
G16	Dec 16/80	79
G17	Dec 16/80	14
	Jan 13/81	350
G18	Nov 4/80	≥2400
	Nov 12/80	≥24.000
	Dec 9/80	≥2400
G19	Jul 8/80	920
	Jul 14/80	≥2400
	Jul 21/80	≥2400
	Jul 29/80	≥2400
	Aug 6/80	3500
	Aug 12/80	2400
	Aug 19/80	≥2400
	Sep 2/80	≥24,000
	Oct 28/80	≥2400
	Nov 4/80	≥2400
	Nov 12/80	24,000
	Nov 18/80	2400
	Nov 25/80	3500
	Dec 2/80	170
	Dec 9/80	920
	Dec 16/80	1600
	Jan 5/81	1100
G20	Aug 12/80	110
	Aug 19/80	70
G21	Dec 9/80	≥2400
G22	Nov 4/80	1600
	Dec 9/80	≥2400
G23	Nov 4/80	≥2400
	Nov 25/80	2400
	Dec 2/80	≥2400
	Dec 9/80	1600
	Dec 16/80	1600
	Jan 5/81	5400
G24	Nov 25/80	490
	Dec 2/80	540
	Dec 9/80	280
G25	Nov 18/80	920
	Nov 25/80	350
	Dec 2/80	≥2400
	Jan 5/81	79
G26	Nov 18/80	49
G27	Nov 18/80	49
G28	Nov 4/80	≥2400
	Nov 12/80	22
	Dec 2/80	≥2400
	Dec 9/80	≥2400
	Jan 5/81	920
G29	Jul 1/80	180
	Jul 8/80	46
	Jul 14/80	130
	Jul 21/80	≥2400
	Jul 29/80	49
	Aug 6/80	920
	Aug 12/80	920
	Aug 19/80	350
	Aug 26/80	170
	Sep 29/80	280
	Oct 28/80	27
	Nov 12/80	49
	Dec 9/80	240
G30	Nov 12/80	2
	Dec 9/80	≥2400
G31	Dec 16/80	2
G32	Dec 16/80	≥2400
	Jan 5/81	9200
	Jan 12/81	≥2400

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
G33	Dec 16/80	130
G34	Dec 17/80	< 2
G35	Jan 12/81	≥2400
G36	Sep 23/80	540
	Sep 29/80	170
	Oct 7/80	110
	Oct 28/80	17
	Dec 16/80	2
G37	Jul 1/80	49
	Jul 8/80	33
	Jul 14/80	46
	Jul 21/80	46
	Jul 29/80	540
	Aug 6/80	79
	Sep 2/80	350
	Sep 29/80	23
	Oct 28/80	33
	Nov 12/80	11
	Dec 16/80	2
	Jan 5/81	49
G38	Dec 16/80	7
G39	Nov 18/80	140
S17	Jun 9/80	540
S19	Nov 4/80	≥2400
F3	Mar 31/81	3500
F4	Mar 31/81	5400
F5	Mar 31/81	3500
F6	Mar 31/81	5400
F7	Mar 31/81	9200
E1	Jun 23/80	5
	Jul 1/80	2
S20.S	May 27/80	79
	Jun 2/80	< 2
	Jun 9/80	13
	Jun 23/80	2
	Nov 4/80	130
S20.L	Jun 9/80	≥2400
	Jul 8/80	33
	Jul 14/80	26
	Nov 4/80	540
S21	May 27/80	350
	Jun 2/80	920
	Jun 9/80	≥2400
	Jun 23/80	240
	Jul 1/80	79
	Jul 8/80	350
	Jul 14/80	79
	Jul 29/80	23
	Aug 6/80	79
	Aug 12/80	23
	Nov 4/80	350
D1	Dec 16/80	17
D2	Jul 8/80	< 2
D3	Jul 1/80	350
	Jul 8/80	23
	Jul 14/80	79
	Jul 21/80	49
	Jul 29/80	23
	Aug 19/80	70
	Aug 26/80	≥2400
	Nov 12/80	170
D4	Jul 1/80	5
	Jul 8/80	240
	Jul 29/80	< 2

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
D5	Jul 14/80	70
	Jul 21/80	240
	Jul 29/80	170
	Aug 6/80	13
D6	Jul 14/80	21
	Jul 21/80	110
	Jul 29/80	46
D7	Jul 14/80	220
	Jul 21/80	130
	Jul 29/80	79
	Sep 2/80	≥240,000
	Sep 23/80	130
	Oct 21/80	11
	Nov 25/80	920
D8	Dec 9/80	≥2400
D9	Jul 29/80	49
D10	Jun 23/80	2
	Jul 1/80	2
	Nov 12/80	5
D11	Jun 23/80	7
	Jul 1/80	33
	Jul 8/80	33
	Jul 14/80	2
	Jul 21/80	8
	Jul 29/80	8
	Aug 5/80	8
	Aug 12/80	13
	Aug 19/80	130
	Sep 2/80	540
	Sep 23/80	33
	Nov 4/80	1600
	Nov 12/80	1600
	Nov 18/80	49
	Nov 25/80	240
	Dec 2/80	49
	Dec 9/80	33
S22	May 27/80	16,000
	Jun 2/80	≥2400
	Jun 9/80	≥2400
	Jun 23/80	920
	Jul 1/80	≥2400
	Jul 8/80	≥2400
	Jul 14/80	540
	Jul 21/80	350
	Jul 29/80	≥2400
	Aug 6/80	≥2400
	Aug 12/80	≥2400
	Aug 19/80	≥2400
	Nov 4/80	≥2400
	Nov 12/80	490
A1	Jan 7/81	540
A2	Jul 21/80	540
	Jul 29/80	540
	Aug 6/80	1600
	Aug 12/80	350
	Jan 7/81	920
A3	Jan 7/81	≥2400
A4	Jan 7/81	2

APPENDIX VIII

Patricia Bay Bacteriological Results for Marine Sample Stations

Patricia Bay bacteriological results
for marine sample stations*

SAMPLE STATIONS	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	1980			
16	Jun 11			2
	Jun 19		27.5	< 2
	Sep 24	0941	26.2	2
	Oct 2	0901	22.5	< 2
	Oct 8	0850		33
	Oct 16	0840	29.7	< 2
	Oct 21	1002	28.5	< 3
	Nov 6	0929	16.5	540
	Nov 12	1006		2
	Nov 26	1006	21.5	920
17	Jun 11			2
	Jun 19			5
	Sep 24	0849	25.0	< 2
	Oct 2	0909		< 2
	Oct 8	0856		49
	Oct 16	0847	30.3	< 2
	Oct 21	0935	26.4	< 3
	Nov 6	0034	19.4	920
	Nov 12	1009		7
	Nov 26	1014	17.3	33
18	Jun 11			7
	Jun 19		28.0	5
	Aug 21			< 2
	Sep 2			8
	Sep 18	1040	14.5	23
	Sep 24	0825	24.7	< 2
	Oct 2	0931		< 2
	Oct 8	0910		2
	Oct 16	0905	29.7	< 2
	Oct 21	1015	28.5	< 3
	Nov 6	0945	19.5	8
	Nov 12	1019		5
	Nov 26	1026	16.5	170
19	Jun 11			4

*No entry means time or salinity not available for date.

SAMPLE STATIONS	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	Jun 19		28.3	< 2
	Aug 21			< 2
	Sep 2			8
	Sep 18	1048	18.7	2
	Sep 24	0831	25.4	2
	Oct 2	1006		5
	Oct 8	0916		2
	Oct 16	0912	28.5	< 2
	Oct 21	1025	26.4	4
	Nov 6	0949	20.3	110
	Nov 12	1022		170
	Nov 26	1033	12.5	≥2400
19A	Aug 21			2
	Sep 2			17
	Sep 18	1054	18.7	5
	Sep 24	0906	27.1	2
	Oct 2	1009		13
	Oct 8	0921		130
	Oct 16	0917	28.0	2
	Oct 21	1029	27.0	< 3
	Nov 6	1000	21.5	170
	Nov 12	1029		2
	Nov 26	1036	14.0	130
20	Jun 11			23
	Jun 19		28.2	170
	Aug 21			2
	Sep 2			8
	Sep 18	1103	23.2	33
	Sep 24	0912	25.0	17
	Oct 2	1011		130
	Oct 8	0925		2
	Oct 16	0924	27.5	4
	Oct 21	1045	26.8	4
	Nov 6	1007	21.6	350
	Nov 12	1030		7
	Nov 26	1040	16.5	23
21	Jun 11			23
	Jun 19		28.5	240
	Aug 21			5
	Sep 2			8
	Sep 18	1109	23.7	5
	Sep 24	0922	20.3	33
	Oct 2	1015		5

SAMPLE STATIONS	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
21	Oct 8	0931		240
Cont'd	Oct 16	0930	30.3	4
	Oct 21	1057	26.8	4
	Nov 6	1012	22.0	7
	Nov 12	1033		17
	Nov 26	1045	17.3	240
22	Jun 11			8
	Jun 19		27.9	8
	Aug 21			< 2
	Sep 2			8
	Sep 18	1113	23.8	2
	Sep 24	0933	26.0	2
	Oct 2	1018		79
	Oct 8	0933		23
	Oct 16	0945	28.5	< 2
	Oct 21	1105	26.8	4
	Nov 6	1015	22.9	2
	Nov 12	1006		17
	Nov 26	1006	17.3	540
23	Jun 11			240
	Jun 19		28	5
	Aug 21			< 2
	Sep 2			33
	Sep 18	1118	23.7	350
	Sep 24	0941	26.0	13
	Oct 2	1022		< 2
	Oct 8	0937		8
	Oct 16	0905	29.0	< 2
	Oct 21	1110	28.7	4
	Nov 12	1118		49
	Nov 26	1054	17.3	11
23A	Jun 11			33
	Jun 19			7
	Aug 21			5
	Sep 2			220
	Sep 18	1123	18.7	5
	Sep 24	0951	24.8	350
	Oct 2	1029		2
	Oct 8	0942		46
	Oct 16	1054	28.5	23
	Oct 21	1115	24.5	7
	Nov 6	1023	24.6	23
	Nov 12	1120		130
	Nov 16	1100	6.0	49

APPENDIX IX

Patricia Bay Bacteriological Results of Clam Sample Analysis

Patricia Bay bacteriological results
of clam sample analysis

SAMPLE STATIONS	DATE	FECAL COLIFORM MPN/100 ml
R1	Sep 23/80	< 20
R2	Sep 23/80	< 20
	Nov 27/80	2400
	Jan 9/81	230
R3	Sep 23/80	130
	Oct 7/80	1700
	Oct 20/80	230
	Nov 27/80	1700
	Jan 9/81	220
R4	Oct 7/80	790
	Nov 27/80	490
R5	Oct 7/80	130
	Nov 27/80	2400

APPENDIX X

Mill Bay Bacteriological Results for Freshwater Sample Stations

Mill Bay bacteriological results
for freshwater sample stations.

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
	1980	
S48	Jul 7	23
	Jul 22	22
	Nov 24	2
S50	Jun 3	5
	Jun 10	240
	Jun 24	49
	Jul 2	13
	Jul 7	33
	Jul 15	17
	Nov 11	23
S51	Jun 3	540
	Jun 10	350
	Jun 24	170
	Jul 2	350
	Jul 7	540
	Jul 15	79
	Jul 22	130
	Jul 28	1600
	Aug 5	540
	Aug 11	350
	Aug 18	920
	Oct 6	≥2400
	Oct 20	49
	Oct 27	46
	Nov 3	1600
P1	Jul 15	920
	Jul 22	17
	Jul 28	49
	Aug 5	920
	Aug 11	49
	Aug 18	170
	Aug 25	26
	Oct 14	23
	Oct 27	< 2
	Nov 11	< 2
	Dec 1	33
	1980	
P2	Jul 7	33
	Jul 15	33
	Jul 22	79
	Jul 28	9
	Aug 5	350
	Aug 11	79
P3	Jul 22	540
	Jul 28	220
	Aug 5	130
	Aug 11	33
	Aug 18	1600
	Aug 25	240
	Oct 14	130
	Nov 3	≥2400
	Nov 11	1600
	Nov 24	540
P4	Nov 17	920
P5	Nov 24	17
P6	Aug 5	920
	Aug 11	70
	Nov 24	≥2400
	Dec 1	≥2400
P7	Dec 1	350
	Mar 3/81	33
P8	Dec 1	≥2400
	Mar 3/81	≥24,000
P8A	Mar 3/81	50
P9	Dec 1	240
P11	Nov 17	2

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
	1980	
P12	Aug 5	130
	Aug 11	350
	Nov 17	8
P13	Dec 1	8
P14	Aug 5	22
	Aug 11	8
	Nov 17	350
	Dec 1	540
P15	Nov 24	17
P16	Nov 24	8
S52	Jun 3	350
	Jun 10	110
	Jun 24	540
	Jul 2	240
	Jul 7	350
	Jul 15	920
	Jul 22	≥2400
	Jul 28	540
	Aug 5	220
	Aug 11	1600
	Aug 18	1600
	Aug 25	330
	Sep 2	170
	Sep 22	220
	Sep 30	220
	Oct 6	350
	Oct 14	130
	Oct 27	49
	Nov 3	920
	Nov 11	350
	Nov 17	170
	Nov 24	70
	Dec 1	79
L1	Jun 24	≥2400
	Jul 2	1600
	Jul 7	540
	Jul 15	540
	Jul 22	≥2400
	Jul 28	≥2400
	Aug 5	240
	Aug 11	540
	Aug 18	≥2400
	Aug 25	1100
	Sep 22	540
	Oct 14	240
	Nov 3	920
	Nov 17	170
L2	Jul 7	≥2400
	Jul 15	540
	Jul 22	920
	Jul 28	≥2400
	Aug 5	540
	Aug 11	23
	Aug 18	1600
	Aug 25	940
	Oct 14	130
	Oct 27	350
	Nov 3	350
	Nov 17	350
L3	Jul 22	540
	Jul 28	240
	Aug 5	13
	Aug 11	8
	Oct 14	23
	Nov 3	540
L4	Jul 7	≥2400
	Jul 15	240
	Jul 22	≥2400
	Jul 28	≥2400
	Aug 5	3500
	Aug 11	9200
	Aug 18	≥2400
	Aug 25	3500
	Sep 2	350
	Sep 22	920
	Sep 30	≥2400
	Oct 6	5400
	Oct 14	540
	Oct 27	≥2400
	Nov 3	≥2400
	Nov 11	350
	Nov 17	170
	Nov 24	240

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
	1980	
L5	Sep 3	540
	Sep 22	540
	Sep 30	540
	Oct 14	220
	Oct 27	79
	Nov 3	540
	Nov 11	350
	Nov 17	130
	Nov 24	240
L6	Aug 11	920
	Aug 18	240
	Aug 25	46
	Sep 30	350
	Oct 14	130
	Nov 3	350
L7	Aug 5	46
	Aug 11	920
	Aug 18	350
	Aug 25	17
	Sep 2	540
	Sep 23	1600
	Sep 30	240
	Oct 14	920
	Oct 27	170
	Nov 3	920
	Nov 11	240
	Nov 17	79
L8	Sep 30	130
L9	Jul 7	70
	Jul 15	200
	Jul 22	130
	Jul 28	49
	Aug 5	23
	Aug 18	79
	Aug 25	2
	Sep 2	5
	Sep 22	23
	Sep 30	79
	Oct 6	5
	Oct 14	9
	Oct 27	8
	Nov 3	33
	Nov 11	130
	Nov 17	94
	Nov 24	220
	Dec 1	94
L10	Jul 7	70
	Jul 15	70
	Jul 22	79
	Jul 28	79
L11	Jul 7	22
	Jul 28	49
	Nov 17	170
	Dec 1	17
L12	Jul 7	7
	Jul 15	13
	Nov 24	13
H1	Jun 24	94
H2	Jun 24	170
	Jul 2	130
	Jul 7	350
	Jul 15	70
	Jul 22	350
	Jul 28	220
	Aug 5	350
	Aug 11	110
	Aug 18	$\geq$2400
	Aug 25	230
	Sep 3	540
	Sep 22	540
	Oct 14	240
	Oct 27	33
	Nov 3	49
	Nov 11	23
	Nov 24	220
	Dec 1	23
H3	Jul 7	79
	Jul 15	220

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
	1980	
	Jul 22	920
	Jul 28	79
	Aug 5	170
	Aug 25	350
	Oct 14	130
	Nov 3	49
H4	Oct 14	2
H5	Jul 2	240
	Jul 7	130
	Jul 15	350
	Jul 22	350
	Jul 28	≥2400
	Aug 5	540
	Oct 14	49
	Oct 27	11
	Nov 3	49
H6	Jul 2	49
	Jul 7	130
	Jul 15	220
	Jul 22	540
	Jul 28	540
	Aug 5	170
	Oct 14	17
	Oct 27	≥2
	Nov 3	240
C1	Jul 7	240
	Jul 15	350
	Jul 22	≥2400
	Jul 28	1600
	Aug 5	≥2400
	Aug 11	≥2400
	Aug 18	≥2400
	Aug 25	5400
	Sep 2	≥2400
	Oct 6	130
	Oct 14	49
	Oct 27	7
	Nov 3	920
	Nov 11	49
	Nov 17	130
	Nov 24	220
C2	Aug 18	920
	Aug 25	≥2400

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 m
	1980	
	Oct 14	13
	Oct 27	27
	Nov 3	≥2400
	Nov 11	≥2400
	Nov 17	790
N1	Aug 18	350
N2	Aug 11	≥2400
	Aug 25	350
	Oct 14	49
	Nov 3	1600
	Nov 11	140
	Nov 17	130
M1	Sep 3	≥2400
	Sep 17	79
	Sep 22	920
	Sep 30	33
	Nov 3	920
	Nov 24	920
	Dec 1	1600
	Apr 1/81	50
M2	Sep 17	17
	Sep 22	49
	Sep 30	31
	Nov 3	1600
	Dec 1	≥2400
	Mar 3/81	540
	Apr 1/81	130
M3	Mar 3/81	240
	Apr 1/81	20
M4	Mar 3/81	170
	Apr 1/81	50
M5	Apr 1/81	< 20
M6	Apr 1/81	≥24,000
S53	Jun 3	180
	Jun 10	≥2400
	Jun 24	240
	Jul 2	≥2400
	Jul 7	1600
	Jul 15	≥2400

SAMPLE STATION	DATE	FECAL COLIFORM MPN/100 ml
	1980	
S53	Jul 22	1600
cont'd	Jul 28	240
	Aug 5	12
	Aug 11	33
	Aug 18	350
	Sep 2	≥2400
	Sep 30	9
	Nov 3	≥2400
	Nov 11	≥2400
	Nov 17	790
	Nov 24	1600
	Dec 1	540
K1	Jun 24	130
	Jul 2	≥2400
	Jul 7	170
	Jul 15	≥2400
	Jul 22	≥2400
	Jul 28	920
	Aug 5	≥2400
	Nov 3	≥2400
	Nov 11	210
	Nov 17	540
	Dec 1	920
K1A	Mar 3/81	≥24,000
K1B	Apr 1/81	230
K1C	Apr 1/81	490
K2	Jul 2	1600
	Jul 7	350
	Jul 15	130
	Jul 22	920
	Sep 30	≥2400
	Nov 3	≥2400
	Nov 11	230
	Nov 17	920
K3	Nov 3	≥2400
K4	Nov 24	170

APPENDIX XI

Mill Bay Bacteriological Results for Marine Sample Stations

Mill Bay bacteriological results
for marine sample stations

SAMPLE STATION	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	1980			
73	Jun 10			< 2
	Jun 18		27.8	< 2
	Nov 20	1135	20.9	79
74	Jun 10			< 2
	Jun 18		27.8	2
	Sep 17		18.1	< 2
	Nov 20	1129	20.8	< 2
75	Jun 10			< 2
	Jun 18		27.3	< 2
	Sep 17		16.4	< 2
	Sep 25	1120	26.1	< 2
	Oct 1	1119	23.7	2
	Oct 6	1152		4
	Oct 20			< 2
	Nov 11	1328		6
	Nov 20	1125	19.4	23
77	Jun 10			5
	Jun 18		27.3	79
	Sep 17		16.4	< 2
	Sep 25	1113	26.4	< 2
	Oct 1	1116	23.8	17
	Oct 6	1150		2
	Nov 11	1319		23
	Nov 20	1122	18.5	33
78	Sep 17		17.0	< 2
	Sep 25	1105	26.0	< 2
79	Jun 10			< 2
	Jun 18		25.6	6
	Oct 1		22.8	2
	Oct 6			8
	Oct 20			2
	Nov 11			8
	Nov 20		16.8	13

SAMPLE STATION	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	1980			
81	Jun 10			13
	Jun 18		27.3	13
	Sep 17			4
	Sep 25	1058	26.5	< 2
	Oct 1	1103	23.7	2
	Oct 6			5
	Oct 20			< 2
	Nov 11	1312		8
	Nov 20	1110	16.7	17
83	Jun 10			13
	Jun 18		27.3	33
	Sep 17			22
	Sep 25	1052	27.0	5
	Oct 1	1057	23.7	2
	Oct 6			< 2
	Oct 20			2
	Nov 11	1308		2
	Nov 20	1105	13.9	79
86 A	Sep 3			17
	Sep 17		15.3	49
	Sep 25	1044	24.9	27
	Oct 1	1049	22.6	33
	Oct 6			13
	Oct 20			2
	Nov 11	1305		8
	Nov 20	1100	10.8	46
87	Jun 10			130
	Jun 18		27.3	7
	Aug 20		26.0	< 2
	Sep 3			2
	Sep 17		17.0	33
	Sep 25	944	24.9	22
	Oct 1	1043	23.3	5
	Oct 6			5
	Nov 11	1250		130
	Nov 20	1051	3.5	33
88 A	Aug 20	1045	27.0	< 2
	Sep 3			2
	Sep 17			2
	Sep 25	933	26.0	< 2
	Oct 1	1037	22.7	< 2
	Nov 11	1250		130
	Nov 20	1043	2.6	79

SAMPLE STATION	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	1980			
88	Aug 20	1045	27.0	< 2
	Sep 3			2
	Sep 17		9.5	< 2
	Sep 25	912	24.9	5
	Oct 1	931	21.3	8
	Oct 6			< 2
	Oct 20			2
89	Jun 10			350
	Jun 18		5.6	130
	Aug 20	1045	20.0	110
	Sep 3			5
	Sep 17		14.0	2
	Sep 25	906	23.6	2
	Oct 1	937	21.4	22
	Oct 6			5
	Oct 20			5
	Nov 11	1050		110
	Nov 20	1030	2.6	350
90	Jun 10			920
	Jun 18		5.5	79
	Aug 20	1045	26.0	< 2
	Sep 3			33
	Sep 17		15.0	< 2
	Sep 25	900	25.2	2
	Oct 1	945	21.6	22
	Oct 6			2
	Oct 20			13
	Nov 11	1040		1600
	Nov 20	1023	7.9	170
91	Aug 20	1045	29.0	< 2
	Sep 3			< 2
	Sep 17		16.5	8
	Sep 25	852	21.5	2
	Oct 1	921	19.5	13
92	Jun 10			22
	Jun 18		27.2	5
	Oct 1	1009	22.0	2
	Oct 6			< 2
	Oct 20			2
	Nov 11	1036		8
	Nov 20	138		23
93	Sep 25	1027	25.4	< 2

SAMPLE STATION	COLLECTION DATE	TIME (PST)	SALINITY °/oo (PPT)	FECAL COLIFORM MPN/100 ml
	1980			
94	Jun 10			2
	Jun 18		27.2	< 2
	Sep 25	1011	25.4	< 2
	Oct 1	1022	22.6	31
	Oct 6			< 2
	Oct 20			< 2
	Nov 11	1030		2
	Nov 20	1000	10.0	49

APPENDIX XII

Mill Bay Bacteriological Results of Clam Analysis

Mill Bay bacteriological results
of clam sample analysis.

SAMPLE STATION	COLLECTION DATE 1980	FECAL COLIFORM MPN/100 GRAMS
Q1	Sep 22	< 20
Q2	Sep 22	110
	Nov 23	1100
Q3	Sep 22	170
	Oct 6	490
	Nov 23	2400
Q4	Oct 6	20
Q5	Oct 6	< 20
V1	Oct 20	50
	Nov 23	790

APPENDIX XIII

Daily Rainfall Record for

Victoria International Airport

May 25, 1980 to January 14, 1981

Daily Rainfall Record for
Victoria International Airport
May 25, 1980 to January 14, 1981

DATE	RECORDED RAINFALL (mm)	DATE	RECORDED RAINFALL (mm)	DATE	RECORDED RAINFALL (mm)
1980		1980		1980	
May 25	1.0	July 4	3.6	Aug 14	0.0
26	2.8	5	trace	15	0.0
27	8.9	6	0.0	16	0.0
28	1.2	7	0.0	17	9.9
29	0.4	8	0.0	18	0.0
30	0.0	9	0.0	19	0.0
31	0.6	10	trace	20	0.0
		11	3.8	21	0.0
June 1	0.4	12	0.0	22	trace
2	0.6	13	1.0	23	0.0
3	trace	14	0.0	24	0.0
4	2.8	15	0.0	25	0.0
5	0.2	16	0.0	26	2.0
6	trace	17	0.0	27	0.3
7	0.6	18	0.0	28	0.0
8	31.0	19	3.4	29	0.0
9	trace	20	0.0	30	0.2
10	1.4	21	0.0	31	0.0
11	0.0	22	0.0		
12	0.0	23	0.0	Sep 1	12.8
13	0.0	24	0.0	2	0.2
14	0.0	25	0.0	3	trace
15	0.0	26	0.0	4	0.0
16	14.2	27	0.0	5	0.0
17	0.0	28	0.0	6	6.0
18	0.0	29	0.0	7	0.0
19	0.0	30	0.0	8	0.0
20	0.0	31	0.0	9	0.0
21	0.0			10	0.0
22	2.6	Aug 1	trace	11	0.0
23	trace	2	trace	12	1.5
24	0.8	3	0.0	13	0.2
25	23.7	4	0.0	14	0.0
26	1.6	5	0.0	15	0.0
27	0.2	6	0.0	16	0.0
28	0.0	7	0.0	17	0.0
29	0.0	8	0.0	18	0.0
30	0.0	9	0.0	19	6.7
		10	0.0	20	0.4
July 1	0.0	11	0.0	21	trace
2	0.0	12	0.0	22	2.9
3	14.0	13	0.0	23	0.0

DATE	RECORDED RAINFALL (mm)	DATE	RECORDED RAINFALL (mm)	DATE	RECORDED RAINFALL (mm)
1980		1980		1980	
Sep 24	0.0	Nov 3	26.6	Dec 14	4.7
25	0.0	4	7.8	15	trace
26	0.0	5	9.0	16	trace
27	0.0	6	12.4	17	0.4
28	0.6	7	22.4	18	0.0
29	5.1	8	4.2	19	0.0
30	0.0	9	2.8	20	11.5
		10	0.2	21	20.1
Oct 1	0.0	11	0.0	22	1.5
2	0.0	12	0.0	23	trace
3	0.0	13	0.0	24	12.4
4	0.0	14	3.1	25	16.8
5	0.0	15	0.0	26	45.2
6	0.0	16	1.8	27	9.4
7	0.0	17	5.2	28	trace
8	0.0	18	10.2	29	1.6
9	0.0	19	1.6	30	18.6
10	0.0	20	15.9	31	4.0
11	1.8	21	59.0		
12	10.0	22	0.0	Jan 1	0.0
13	0.0	23	trace	1981 2	0.0
14	0.0	24	0.0	3	trace
15	0.0	25	5.2	4	0.0
16	0.0	26	0.6	5	0.0
17	0.0	27	20.2	6	1.3
18	0.0	28	7.7	7	0.0
19	0.2	29	18.8	8	1.1
20	0.4	30	4.8	9	3.0
21	0.5			10	0.0
22	0.0	Dec 1	12.1	11	0.0
23	0.0	2	10.0	12	0.0
24	4.6	3	0.6	13	trace
25	0.4	4	6.6	14	0.0
26	0.0	5	6.3		
27	0.0	6	1.1		
28	0.0	7	0.0		
29	0.0	8	0.8		
30	0.0	9	2.8		
31	8.7	10	14.6		
		11	3.4		
Nov 1	5.9	12	0.0		
2	trace	13	0.8		

APPENDIX XIV

Results of Marine Sampling at Brentwood College Sewage Treatment Plant Outfall

Results of Marine Sampling at Brentwood College Sewage Treatment Plant Outfall

Marine water samples were taken at various depths at and near the end of the sewage outfall of the sewage treatment system at Brentwood College, Mill Bay, during a pump-out of unchlorinated sewage effluent. The results are as follows:

Run 1: directly over the end of the outfall pipe.

depth (m)	fecal coliform MPN/100 ml	50 m northwest of the outfall depth (m)	MPN/100 ml
12	L2		
9	L2	6	L2
6	L2	3	L2
3	2	0	2
0	5		

A sample of the effluent taken from the STP prior to discharge had an MPN of greater than or equal to 2.4 million/100 ml.

Run 2: directly over the end of the outfall pipe.

12	2
9	5
6	L2
3	L2
0	2

Additional sites from 1.5 m depth taken near the outfall.

Site	MPN/100 ml
A. 50 m towards government dock (175 compass bearing)	L2
B. 100 m towards government dock (175 compass bearing)	L2
C. 50 m northwest of outfall	L2
D. 100 m northwest of outfall	L2
E. 50 m east of outfall	L2

A sample taken from Shawnigan Creek (S52) on the same date had a fecal coliform MPN of 110/100 ml.

The samples were analysed by the Public Health Branch, Vancouver, B.C.